MATERIAL SPECIFICATION FOR DOCUMENT 205522

1 MATERIAL NUMBER

205522

2 MATERIAL TYPE/COLOR

2.1 COVERS:

8.5” X 11” 65 Lb. Grey speckletone. Cover – smooth finish.

2.2 INTERNAL PAGES

8.5” X 11” 50 Lb. White Opaque Paper, Offset.

11” X 17” 50 Lb. White Opaque Paper, Offset.

2.3 BINDING:

Unicoil Binding System, Color: College Orange, sized to match the document. Complete stacked internal pages will be drilled to match the Unicoil configuration.

3 PRINT COLORS

3.1 FRONT COVER

The front cover will be single sided, produced using xerographic methods from provided camera-ready originals, or printed directly from provided electronic masters.

3.2 REAR COVER

The rear cover will be left blank.

3.3 INTERNAL PAGES

Internal pages will be double sided, produced using xerographic methods from provided single-sided camera-ready originals or printed from provided electronic masters. All internal copies will be black.

4 CERTIFICATION

Certification is not required; however, a packing list with the following information is required:

- MEDRAD Material Number
- Purchase Order Number
- Quantity Shipped

Do Not Print This Page

MEDRAD MR

Installation and Service Manual

Continuum MR Infusion System and Wireless Remote Accessory

CONTINUUM MR INFUSION SYSTEM

MEDRAD®
Performance. For life.™

205522 Rev B

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TABLE OF CONTENTS

TABLE OF CONTENTS ..... **iv**

1 - Introduction **1-1**
Using the Manual 1-1
Important Safety Notice 1-1
Trademarks 1-1
Disclaimers 1-1
Understanding Symbols 1-1
Warnings 1-4
Cautions 1-5

2 - System Overview **2-1**

3 - System Installation **3-1**
Installing an Infusion System without a Remote Accessory 3-2
Installing an Infusion System with a Remote Accessory 3-2
Translation Materials and Instructions 3-4

4 - Pump Service **4-1**
Overview 4-1
Replacing an Infusion Pump 4-1
Installing or Replacing a Pump Battery 4-1
Calibrating a Pump 4-1
Viewing the Infusion History 4-2
Troubleshooting 4-2
Periodic Maintenance 4-3

5 - Bracket Service **5-1**
Overview 5-1
Enabling Wireless on a Bracket 5-1
Installing or Replacing a Wireless Battery 5-1
Replacing a Wireless Bracket 5-2
Troubleshooting 5-2
Periodic Maintenance 5-3

6 - Remote Display Service **6-1**
Overview 6-1
Accessing the Service Screen 6-2
Accessing the Operating System 6-4
Enabling and Disabling the Hard Drive Protection Feature 6-4
Installing or Upgrading the Application Software 6-6
Upgrading the OS and BIOS Software 6-6
Viewing the Software Version 6-7
Configuring the Certo Network Settings for Wireless Operation 6-7
Configure the SSID 6-8
Configure the IP Addresses 6-9
Configuring Stands and Brackets 6-12

Adding a Stand 6-13
Removing a Stand 6-13
Adding a Bracket 6-13
Replacing a Bracket 6-16
Reconfiguring a Bracket 6-16
Removing a Bracket 6-16
Testing a Bracket 6-17
Updating Certo's Permitted MAC List 6-17
Adding a Certo Module 6-18
Removing a Certo Module 6-18
Adding MAC Addresses to the Certo Module 6-19
Calibrating the Touchscreen 6-19
Downloading Event Logs 6-20
Copying Configuration Data to another Remote or saving the file as a back-up 6-20
Configuring the Remote for Hardwire Connection 6-20
Troubleshooting Errors 6-23
Troubleshooting Network Issues 6-24
Troubleshooting Remote Display Communication Issues 6-25
Troubleshooting Bracket Communication Issues 6-26
Understanding Remote Display Communication Status Messages 6-28
Troubleshooting Certo Issues 6-29
Wireless Diagnostic Tools 6-29
Signal Scan Tool 6-30
Network Status Tool 6-30
Latency Test 6-30
Periodic Maintenance 6-30

7 - Assembly Drawings 7-1

1 - Introduction

Using the Manual

This manual contains information on field service and maintenance for the Continuum MR Infusion System and Wireless Remote Accessory. MEDRAD urges you to read this manual carefully, become familiar with the procedures and system functions that it describes, and follow its recommendations to assure proper and safe use of the system.

This manual assumes basic familiarity with system operation. Refer to the Operation Manuals for general usage instructions:

205520 – Continuum MR Infusion System Operation Manual
205521 – Continuum Wireless Remote Accessory Operation Manual
204325 – Certo Installation and Service Manual

Important Safety Notice

This device should only be serviced by trained professionals.

Trademarks

MEDRAD, Continuum and *Certo* are registered trademarks of MEDRAD, INC. Other trademarks that appear in this manual are the property of their respective companies.

Disclaimers

MEDRAD disclaims liability for any modifications or interfaces with other equipment that are not in conformity with the specifications and information contained within this manual.

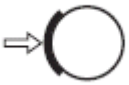
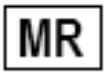
Accessory equipment connected to the *Continuum MR Infusion System* must be certified according to the IEC/EN 60601-1 standard. Furthermore, all configurations shall comply with the system standard IEC/EN 60601-1-1. Anyone who connects additional equipment to the signal input or output part configures a medical system and is therefore responsible that the system complies with the requirements of the standard IEC/EN 60601-1-1. To obtain on-site consulting or consulting references, contact MEDRAD Service.

Understanding Symbols

The following symbols are relevant to servicing the device. Refer to the Operation Manuals for a complete description of all symbols on the device.

Attention, consult accompanying instructions.

Indicates hazardous voltages.

	Indicates Castor Brake is ON.
	Indicates the MR magnet and power.
	MR Conditional. Indicates that an item is appropriate for use in specified MR environments with manufacturer-defined restrictions.
	MR Unsafe. Indicates that an item is not safe to use in MR environments.
	MR Safe. Indicates that an item is appropriate for use in all MR environments.
	Alternating current.
	Direct Current.
	Do not dispose in municipal waste. Symbol indicates separate collection for electronic equipment. (WEEE Directive 2002/96/EEC).
	Do not dispose of battery in municipal waste. Symbol indicates separate collection for battery is required.
IPX0	No protection against ingress of water.
IPX1	Degree of protection against fluid (drip proof).
SN	Serial Number
	Date of Manufacture

Protective Earth

Recycle batteries following hospital protocols and local environmental regulations.

Do not incinerate. Keep away from fire or other sources of extreme heat.

Turn clockwise to lock and counter-clockwise to unlock.

Labels on the system or statements in this manual prefaced by any of the following words and/or symbols are of special significance, intended to help you operate the system in a safe and successful manner:

WARNING: Indicates that the information is a warning. Warnings advise you of circumstances that could result in injury or death to the patient or operator. Read and understand the warnings before operating the system.

CAUTION: Indicates that the information is a caution. Cautions advise you of circumstances that could result in damage to the device. Read and understand the cautions before operating the system.

Note:

Indicates that the information that follows is additional important information, or a tip that will help you recover from an error or point you to related information within the manual.

Warnings

The following warnings are relevant to servicing the device. Refer to the Operation Manuals for a complete description of all system warnings.

WARNING: DO NOT remove the pump from the bracket or the bracket from the IV pole while in the MR scan room. The pump contains ferromagnetic material and may be attracted toward the magnet. To prevent potential injury or equipment damage, pull on the bottom of the pump to ensure that it is secure in the bracket prior to entering the MR scan room.

WARNING: Ensure that the remote display's stand configuration matches the physical placement of the brackets on the stands. The stands and brackets are configured to the Remote Display and are controlled according to the configuration. Always check and update (if necessary) the Remote Display configuration after moving a bracket. Serious injury to the patient may result if a pump in the wrong bracket is controlled through the Remote Display.

WARNING: DO NOT place the Continuum MR Infusion System in a static magnetic field exceeding 2000 gauss. Ensure that caster brakes are ON. Failure to do so may result in system migration towards the magnet bore.

WARNING: DO NOT remove the bracket or wireless battery while in the MR scan room. The bracket and wireless battery contain ferromagnetic material and may be attracted toward the magnet. To prevent potential injury and equipment damage, move the stand and/or bracket out of the MR scan room prior to opening the battery compartment or removing the bracket from the stand.

WARNING: DO NOT charge the pump while in the MR scan room. DO NOT take the battery charger power supply into the MR scan room. The power supply contains ferromagnetic material and may be attracted toward the magnet. Charge the pump outside the MR scan room to prevent potential injury and equipment damage.

WARNING: DO NOT take the Remote Display and / or the Remote Display power supply into the scan room. The Remote Display is NOT MR safe and could cause serious injury if taken into the scan room.

WARNING: Use only "MR Safe" tools in the scan room. Tools containing ferromagnetic material may be attracted to the magnet, causing serious injury or equipment damage.

WARNING: Electrical Shock hazard: Operator injury could result from cleaning or servicing the system while powered. DO NOT immerse system components into any type of liquid. In order to avoid shock and prevent damage to the system, always disconnect from line power and remove batteries before cleaning or servicing.

WARNING: DO NOT open batteries. DO NOT dispose of pump or batteries in a fire. Follow all local regulations concerning the disposal of spent Lithium-based batteries or contact MEDRAD for assistance. Improper disposal of battery may result in explosion, leakage, or personal injury.

WARNING: DO NOT attach more than three pumps at one time onto the IV pole. Use of more than three pumps at one time may compromise the accuracy of the individual pumps.

WARNING: DO NOT use damaged components. Visually inspect all components before use. Patient or operator injury may result if damaged components are used.

WARNING: Use only accessories and options provided by MEDRAD and designed for this system (including the supplied mounting brackets and stand.) Use of equipment other than MEDRAD's may result in injury or equipment damage.

WARNING: DO NOT modify the Certo network configuration while other Certo devices are in use. Adjusting Certo configuration parameters may cause an interruption in network service and adversely impact other devices using the Certo network.

Cautions

The following cautions are relevant to servicing the device. Refer to the Operation Manuals for a complete description of all system cautions.

CAUTION: Any adjustments, maintenance, or repair of the pump should be performed by MEDRAD trained representatives only. Any adjustments, maintenance, or repair of the pump by a non-MEDRAD trained representative may impair the operation of the Continuum MR Infusion System and/or the accuracy of an infusion.

CAUTION: DO NOT cover, block, or pour liquid into any of the openings on the Remote Display. The openings on the enclosure of the Remote Display are for air convection to protect the equipment from overheating. Blocking an opening could cause the Remote Display to overheat. Pouring liquid into an opening could cause a fire or electrical shock.

CAUTION: DO NOT clean the pump, bracket or remote display with chemicals such as Xylene, Acetone or similar solvents. These chemicals can cause damage to the plastic components and paint. Follow the cleaning instructions contained in the Continuum MR Infusion System Operation Manual.

CAUTION: Allow the system to stabilize at room temperature before use. Condensation may cause electrical damage to the pump system.

CAUTION: Ensure the Hard Drive Protection feature is enabled when service is complete. Operating without Hard Drive Protection may result in unwanted changes to the operating system files, leading to equipment failure.

Additional warnings, cautions and notes are located throughout this manual, where applicable.

2 - System Overview

The Continuum MR Infusion System consists of one, two or three infusion pumps on an IV stand. Since the infusion pumps contain ferromagnetic material, special mounting brackets are attached to the stand to hold the pumps securely.

The infusion system consists of the following components:

Component	Reference Number
Infusion Pump	3015550
Bracket	3015547
Stand	3009128
IV Stand Crossbar Cap	3018954
System Power Supply	3016276
Pump Battery	3009140

An optional Continuum Remote Accessory can be purchased to enable wireless monitoring and limited control of the pumps from the control room.

The wireless accessory consists of the following components:

Component	Reference Number
Remote Display	3015728
Remote Display Power Supply	3016323
Remote Display Stand	3016275
Wireless Battery	3015511
Stand Identification Label Sheets	DN-209909

Note: the bracket contains all the hardware necessary for wireless communications except the Wireless Battery which serves as a “key” to enable the wireless functions.

3 - System Installation

The instructions in this section describe how to install and configure the Continuum MR Infusion System and Remote Accessory.

WARNING: DO NOT place the Continuum MR Infusion System in a static magnetic field exceeding 2000 gauss. Ensure that caster brakes are ON. Failure to do so may result in system migration towards the magnet bore.

WARNING: DO NOT take the Remote Display and / or the Remote Display power supply into the scan room. The Remote Display is NOT MR safe and could cause serious injury if taken into the scan room.

WARNING: Use only "MR Safe" tools in the scan room. Tools containing ferromagnetic material may be attracted to the magnet, causing serious injury or equipment damage.

WARNING: DO NOT use damaged components. Visually inspect all components before use. Patient or operator injury may result if damaged components are used.

WARNING: Use only accessories and options provided by MEDRAD and designed for this system (including the supplied mounting brackets and stand.) Use of equipment other than MEDRAD's may result in injury or equipment damage.

CAUTION: Any adjustments, maintenance, or repair of the pump should be performed by MEDRAD trained representatives only. Any adjustments, maintenance, or repair of the pump by a non-MEDRAD trained representative may impair the operation of the Continuum MR Infusion System and/or the accuracy of an infusion.

CAUTION: DO NOT cover, block, or pour liquid into any of the openings on the Remote Display. The openings on the enclosure of the Remote Display are for air convection to protect the equipment from overheating. Blocking an opening could cause the Remote Display to overheat. Pouring liquid into an opening could cause a fire or electrical shock.

CAUTION: DO NOT clean the pump, bracket or remote display with chemicals such as Xylene, Acetone or similar solvents. These chemicals can

cause damage to the plastic components and paint. Follow the cleaning instructions contained in the Continuum MR Infusion System Operation Manual.

Note: Inspect and verify all contents before installation and notify MEDRAD if there are any missing or damaged components.

Installing an Infusion System without a Remote Accessory

The following instructions explain how to install an infusion system without a Continuum Remote Accessory. If a remote accessory has been purchased, see the section *Installing an Infusion System with a Remote* Accessory.

1. Assemble pumps and brackets onto stands as explained in the Infusion System Operation Manual.
2. Perform the functional checkout procedure described in the Infusion System Operation Manual for each pump.

Installing an Infusion System with a Remote Accessory

The following instructions explain how to install an infusion system with an optional Continuum Remote Accessory.

1. Ensure that the MEDRAD Certo Wireless Network has been installed and configured. Refer to the Certo Installation and Service Manual for details.
2. Attach the Remote Display Stand to the Remote Display using the hardware provided in the stand packaging.

   Note: There are three different length screws provided. Use the ***shortest length screws*** when attaching the display to the stand.

3. Install the Remote Display Stand using the instructions included in the stand packaging.
4. Install the latest software version on the remote display as explained in *Installing or Upgrading the Application Software*.
5. Configure the remote display's network settings as described in *Configuring the Certo Network Settings*.
6. Add each Certo module IP address to the remote display as explained in *Adding a Certo Module*.
7. Add the remote display to each Certo module list of permitted MAC addresses as explained in *Adding MAC Addresses to the Certo Module*.
8. Convert each bracket to a wireless-capable bracket, as explained in *Enabling Wireless on a Bracket*.
9. Configure stands and brackets on the remote display as explained in *Configuring Stands and Brackets*.
10. Add components to each Certo module list of permitted MAC addresses as explained in *Adding MAC Addresses to the Certo Module*.

11. Assemble the pumps and brackets onto stands as explained in the Continuum MR Infusion System Operation Manual.

WARNING: Ensure that the remote display's stand configuration matches the physical placement of the brackets on the stands. The stands and brackets are configured to the Remote Display and are controlled according to the configuration. Always check and update (if necessary) the Remote Display configuration after moving a bracket. Serious injury to the patient may result if a pump in the wrong bracket is controlled through the Remote Display.

12. Apply an appropriate stand identification label (DN-209909) to an IV stand crossbar cap (3018954). Attach the cap to the stands as shown in the picture below.

13. Test each bracket as explained in *Testing* to verify that the stand configuration matches the physical placement of the brackets and stands.
14. Perform the functional checkout procedure described in the Continuum MR Infusion System Operation Manual for each pump.

Translation Materials and Instructions

The following labeling items have translations available. No other labeling requires changes for non-English locales.

- Infusion System Operations Manual (205520)
- Remote Accessory Operations Manual (205521)
- Label Translation Sheet (DN-210025)

The part numbers for the translated items are formed by suffixing the English part number above with a language code from the table below.

Available Translations…

Brazilian Portuguese	-pt-br
Chinese	-zh
Czech	-cs
Danish	-da
Dutch	-nl
French	-fr
German	-de
Italian	-it
Japanese	-ja
Norwegian	-no
Polish	-pl
Russian	-ru
Spanish	-es
Swedish	-sv
Turkish	-tr

For example:

- The Chinese Infusion System Operations Manual is part number (205520-zh).
- The German label sheet is part number (DN-210025-de).

Application of translated labeling may be done prior to delivery to the customer site, or may be done on-site at time of installation and setup.

> **Note:** The Continuum Installation and Service Manual (205522) is only available in English.

> **Note:** Part number/serial number/regulatory marking labels are not translated; only labeling containing instruction or warnings relevant to safe and effective use of the product are translated.

The language sheet (DN-210025) contains the five labels which must be replaced on the product. There is one for the pump and four for the bracket.

Pump Labeling

The existing warning label (203466) is to be removed and the replacement on the sheet applied. No other labels on the pump are translated.

Bracket Labeling

The four front labels on the bracket (205213, 205210, 205215, 205217) are to be removed and replaced with the ones from the desired language sheet. These labels may be difficult to remove as the adhesive is quite strong.

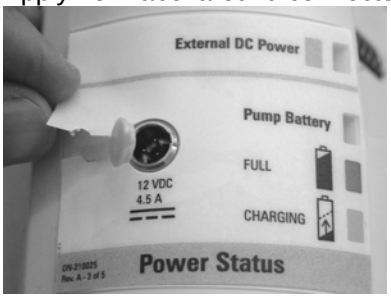
> **Note:** Application of the translated labels on top of the existing ones is not recommended. (The text and graphics of the underlying label will show through the over-applied label).

The Power Status label (lower-left on the bracket front) must be cut before removal as shown in the picture below. This label is applied before the DC input cover is affixed and before the DC input connector is installed.

> **Note:** The DC input cover is glued in place, take care not to tear the cover from the bracket. (Replacement of the cover requires drilling out the glued in “stub” before it can be replaced.)

Cut label around DC-input cover and carefully remove.

Apply new label around connector and DC input cover.



When removing the existing labels you may note that adhesive residue will be left on the bracket as seen in the picture above, the new label can be applied on top of this residue.

4 - Pump Service

Overview

In most cases, pumps are returned to MEDRAD for depot service. Only a limited number of service-related tasks can be performed in the field.

WARNING: DO NOT remove the pump from the bracket or the bracket from the IV pole while in the MR scan room. The pump contains ferromagnetic material and may be attracted toward the magnet. To prevent potential injury or equipment damage, pull on the bottom of the pump to ensure that it is secure in the bracket prior to entering the MR scan room.

Replacing an Infusion Pump

1. Loosen the height adjustment knobs and slide brackets apart on pole
2. Unscrew the brass screw pin on the bottom of bracket to disengage the pump. Exercise care not to completely remove the screw pin.
3. Remove pump from bracket
4. Place the new pump in bracket by manually positioning pump and tightening the screw pin until firmly seated.
5. Pull on the bottom of the pump to ensure that it is secure in the bracket prior to entering the MR scan room.

Installing or Replacing a Pump Battery

The pump battery is reference number 3009140. To install or replace a pump battery:

WARNING: DO NOT open batteries. DO NOT dispose of pump or batteries in a fire. Follow all local regulations concerning the disposal of spent Lithium-based batteries or contact MEDRAD for assistance. Improper disposal of battery may result in explosion, leakage, or personal injury.

1. Open the battery compartment panel on the back of the pump.
2. Remove the old battery and insert the new one.
3. Dispose of the old battery according to local regulations.

Calibrating a Pump

Pumps should be calibrated annually to ensure accurate performance. The pump will display a message on the screen immediately after power-up when calibration is scheduled.

Contact MEDRAD Service to return a pump for calibration and general maintenance.

Viewing the Infusion History

The pump contains a history of infusion events that may be useful in troubleshooting issues. Events such as alarms and error codes are recorded and can be reviewed to help troubleshoot. See the Continuum MR Infusion System Operation Manual for more information on this feature.

Troubleshooting

Common pump error codes and issues are explained in the following table, along with the suggested remedy.

SYMPTOM	**CAUSE**	**REMEDY**
Pump displays Error 25.	Battery malfunction.	Make sure the pump battery contacts are clean. Restart the pump. Replace battery.
Pump **consistently** displays an error number (for example Error 1)	Electrical or mechanical malfunction.	Replace the pump and return to MEDRAD for service
Pump displayed an error number (for example Error 12) but it is not repeatable.	Pump was closer than 2000 Gauss Electrical or mechanical malfunction.	Keep pump outside of 2000 Gauss line. If problem reoccurs: Replace the pump and return to MEDRAD for service
The pump LED is not illuminated when the pump is in the bracket and the bracket has External DC Present.	Poor contact between pump rear connector and bracket connector The pump battery pack is not operable	Clean pump contact pads, inspect bracket contacts for damage. Replace the pump battery pack.
The pump LED does not light green after charging for 6 hours.	The pump battery pack is at end of life.	Replace the pump battery pack.

Periodic Maintenance

The following maintenance should be done on an annual basis:

WARNING: Electrical Shock hazard: Operator injury could result from cleaning or servicing the system while powered. DO NOT immerse system components into any type of liquid. In order to avoid shock and prevent damage to the system, always disconnect from line power and remove batteries before cleaning or servicing.

CAUTION: Any adjustments, maintenance, or repair of the pump should be performed by MEDRAD trained representatives only. Any adjustments, maintenance, or repair of the pump by a non-MEDRAD trained representative may impair the operation of the Continuum MR Infusion System and/or the accuracy of an infusion.

1. Replace the pump battery as explained in *Installing or Replacing a* Pump Battery.
2. Calibrate the pump as explained in *Calibrating a Pump*.

MEDRAD recommends returning the pump to MEDRAD for general preventative maintenance on an annual basis (usually in conjunction with calibration).

The pump is specified for a continuous use life of three years and should be replaced through MEDRAD service at the end of this time.

5 - Bracket Service

Overview

Apart from the battery, there are no field replaceable parts on the bracket. Broken brackets must be replaced with new.

Enabling Wireless on a Bracket

Older brackets (3008895, those having the retaining latch/button) are not capable of wireless communications and must be replaced with a wireless-ready bracket as part of an upgrade.

Wireless-ready brackets (3015547) already contain the electronics necessary for wireless communications. The following instructions explain how to enable their wireless features when the optional Remote Accessory is being installed:

1. Install a wireless battery, as explained in *Installing or Replacing a Wireless Battery*.
2. Configure the remote display for use with the bracket. See the remote display section *Configuring Stands and Brackets*.

Installing or Replacing a Wireless Battery

The following instructions explain how to install or replace a wireless battery in a wireless-ready bracket.

WARNING: DO NOT remove the bracket or wireless battery while in the MR scan room. The bracket and wireless battery contain ferromagnetic material and may be attracted toward the magnet. To prevent potential injury and equipment damage, move the stand and/or bracket out of the MR scan room prior to opening the battery compartment or removing the bracket from the stand.

1. Remove the battery compartment panel on the back of the bracket (held by two screws).
2. Remove the old battery and insert the new one.
3. Dispose of the old battery according to local regulations.

WARNING: DO NOT open batteries. DO NOT dispose of pump or batteries in a fire. Follow all local regulations concerning the disposal of spent Lithium-based batteries or contact MEDRAD for assistance. Improper disposal of battery may result in explosion, leakage, or personal injury.

Replacing a Wireless Bracket

If a wireless bracket must be replaced, there are several important steps to ensure that the remote display configuration is correct.

1. Place the new bracket in the same position as the old one (i.e., top, middle or bottom) on the stand).
2. Update the remote display configuration for the new bracket. See the remote display section *Replacing a Bracket*.
3. Test each bracket as explained in *Testing* to verify that the stand configuration matches the physical placement of the brackets and stands.

WARNING: Ensure that the remote display's stand configuration matches the physical placement of the brackets on the stands. The stands and brackets are configured to the Remote Display and are controlled according to the configuration. Always check and update (if necessary) the Remote Display configuration after moving a bracket. Serious injury to the patient may result if a pump in the wrong bracket is controlled through the Remote Display.

Troubleshooting

Common bracket problems are explained in the following table, along with the suggested remedy.

SYMPTOM	CAUSE	REMEDY
External DC Power LED does not illuminate.	Power supply disconnected. Top/Bottom DC power connections between brackets are not mated properly. Blown fuse on the PCB inside the bracket	Ensure the power supply is connected to wall power and plugged into a bracket on the stand. Un-stack brackets and inspect the top/bottom DC connectors on the brackets, re-stack and retry. If problem persists, replace bracket.
Pump Battery charging/full LED does not illuminate when External DC Power is present	Pump not installed in bracket	
Wireless Battery low/charging/full LED does not illuminate when External DC Power is present.	Wireless is not enabled in the bracket.	Install bracket battery to enable wireless as explained in *Enabling Wireless on a Bracket*.

Either Pump Battery or Wireless Battery never reach full charge after 6 hours.	The battery pack is at end of life.	Replace the battery pack.
Bracket will not communicate with remote display.	Various	See *Troubleshooting Network Issues* in the Remote Display section.

Periodic Maintenance

The wireless battery should be replaced every other year. See *Installing or Replacing a Wireless Battery.*

WARNING: Electrical Shock hazard: Operator injury could result from cleaning or servicing the system while powered. DO NOT immerse system components into any type of liquid. In order to avoid shock and prevent damage to the system, always disconnect from line power and remove batteries before cleaning or servicing.

6 - Remote Display Service

Overview

The remote display is an off-the-shelf component, so there is little in the way of hardware service. However, there are several software-related service tasks related to the remote display software.

WARNING: DO NOT take the Remote Display and / or the Remote Display power supply into the scan room. The Remote Display is NOT MR safe and could cause serious injury if taken into the scan room.

The remote display runs the Microsoft Windows XP Embedded operating system. Windows XP Embedded is nearly identical to the Windows XP operating system that runs on many personal computers. The main difference is that the remote display hides the operating system from the user to protect against unauthorized changes made to the system and the running of any other application other than the remote display software.

Refer to the Remote Accessory Operations Manual (205521) for general information.

Accessing the System Screen

The System Screen contains Date/Time setting, Audio (volume) setting, and Language selection.

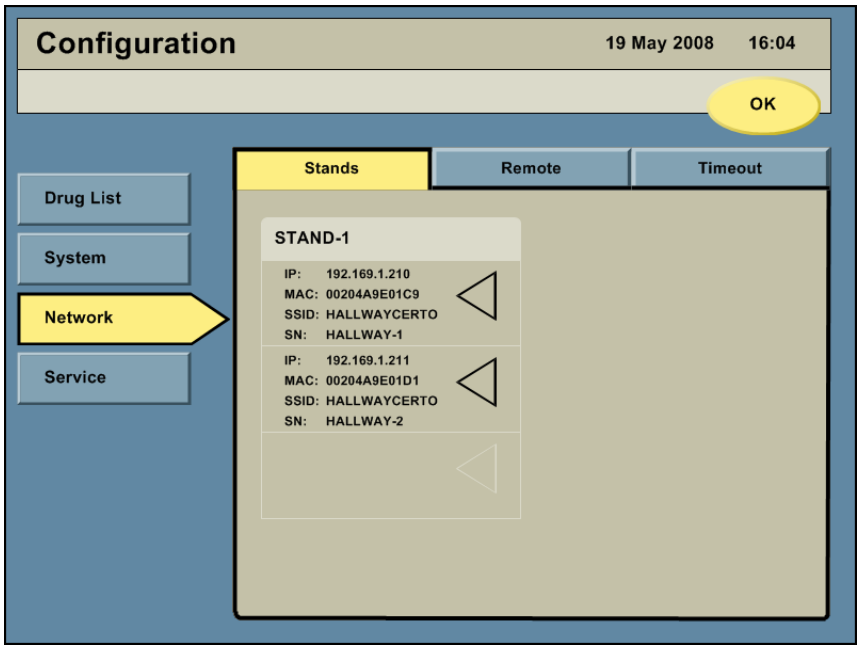
1. Power on the remote display.
2. Select the “None” stand.
3. Press the button at the lower right corner of the screen to enter the configuration screen.
4. Select the “System” section.
5. Select the desired action.
6. Click OK to exit.

Accessing the Network Screen

The Network screen provides the network details for the Stands, Remote, and communications timeout.

Note: You must go to the Service screen to change stand and remote network details; the Network screen will only allow you to view them.

1. Power on the remote display.
2. Select the “None” stand.
3. Press the button at the lower right corner of the screen to enter the configuration screen.
4. Select the “Network” section.



5. Select Stands or Remote for the network details on each.
6. Select Timeout to adjust the time out setting for 2, 3, or 4 seconds. Adjusting this time may be desired if there are occasional drops in communications. The default setting is 2 seconds.

   Note: Increasing the communications timeout may cause "lag" in display updates or command responses. Always use the minimum setting that enables acceptable wireless performance.

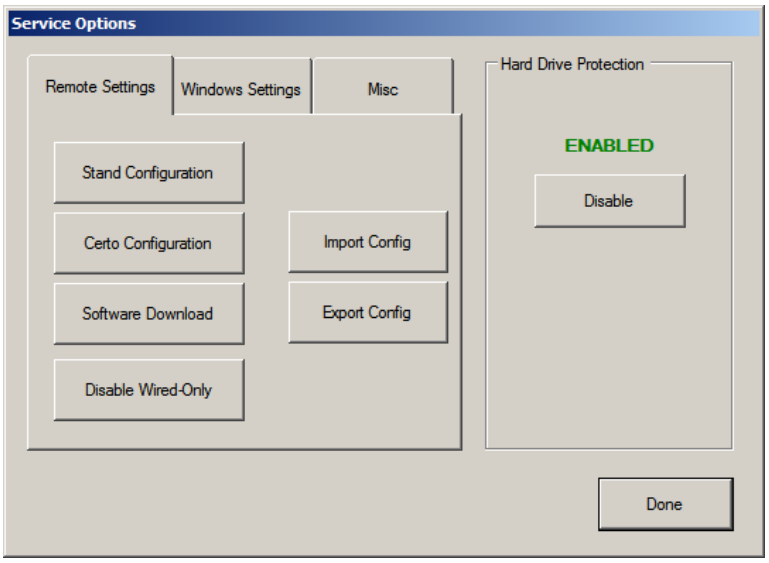
7. To exit click OK.

Accessing the Service Screen

Many service tasks can be done through the remote display software's service screen. To access the service screen:

1. Power on the remote display.
2. Select the "None" stand.
3. Press the button at the lower right corner of the screen to enter the configuration screen.
4. Select the "Service" section.
5. Select the "Technician" tab.
6. Press the "Enter Service Code" button.
7. Enter the service code using the on-screen keyboard.

Upon entering the service screen, you can select from several tabs containing service utilities.



- **Remote Settings** – Configuration related to the remote display application software.
- **Windows Settings** – Configuration related to the Windows XP Embedded operating system.
- **Misc** – Miscellaneous service tasks.
- **Hard Drive Protection** – Displays the status of the Hard Drive Protection feature, and allows you to enable or disable it.

Note: When you click “Done” to exit the service screen, the remote display will reboot. This ensures that any setting changes properly take effect.

Accessing the Operating System

The Windows XP Embedded operating system is hidden from the user while the application software is running. From the service screen, you can exit the application software and access the Windows Control Panel (to make configuration changes), Command Prompt (to run special programs) or File Explorer (for other miscellaneous tasks).

When accessing Windows this way an On Screen Keyboard utility is also started in case no keyboard is available.

Note: Changes made to the operating system **will not be saved** if the Hard Drive Protection feature is **enabled**. See *Enabling and Disabling the Hard Drive Protection Feature*.

Note: When you access the operating system, the mouse cursor and on-screen keyboard can be controlled via the touchscreen. For easier use, connect a USB keyboard and mouse.

To access the Control Panel:

1. Enter the service screen as explained in *Accessing the Service Screen*.
2. Select “Windows Settings”.
3. Select “Control Panel”. The application software will exit and display the Windows Control Panel.

To access the Command Prompt:

1. Enter the service screen as explained in *Accessing the Service Screen*.
2. Select “Misc”.
3. Select “Command Prompt”. The application software will exit and display the Windows Command Prompt.

To access the File Explorer:

1. Enter the service screen as explained in *Accessing the Service Screen*.
2. Select “Misc”.
3. Select “Exit to Windows”. The application software will exit and display the Windows File Explorer.

Enabling and Disabling the Hard Drive Protection Feature

The remote display’s Hard Drive Protection feature (also known as the “write protect filter”) guards against unwanted changes to the operating system files.

As long as the Hard Drive Protection is enabled, changes made to the **C: Drive** (the operating system drive) will be **lost** as soon as the remote display is powered off or rebooted.

CAUTION: Ensure the Hard Drive Protection feature is enabled when service is complete. Operating without Hard Drive Protection may result in unwanted changes to the operating system files, leading to equipment failure.

Note: Changes to the **D: Drive** (the MEDRAD data drive) are **not** affected by the Hard Drive Protection feature.

You can view and change the Hard Drive Protection status through the remote display's service screen.

To view Hard Drive Protection status:

1. Enter the service screen as explained in *Accessing the Service Screen*.
2. The Hard Drive Protection status (enabled or disabled) will be displayed on the right, along with a button to change it.

To enable or disable the Hard Drive Protection feature:

1. Enter the service screen as explained in *Accessing the Service Screen*.
2. If the Hard Drive Protection feature is currently enabled, click the Disable button to disable it.

3. If the Hard Drive Protection feature is currently disabled, click the Enable button to enable it.

   Note: Any time you change the Hard Drive Protection status the remote display will reboot.

   Note: Any time the Hard Drive Protection is disabled, you will see a message when you boot the remote display asking if you want to re-enable it. Saying "Yes" to this popup message will re-enable the protection and immediately reboot the remote display.

   Note: The reboot following a change in the Hard Drive Protection status will take longer than normal due to the need to change the enable/disable status.

Installing or Upgrading the Application Software

The remote display application software is stored on the remote display's **D: Drive** (MEDRAD data drive). It is released as a self-installing executable (EXE) file. For example:

"Continuum Remote Software CWRA-1.4_hu Installer.exe"

To upgrade the application software:

1. Enter the service screen as explained in *Accessing the Service Screen*.
2. Select "Software Download".
3. Click "OK" to exit the application software and display the Windows File Explorer.
4. Insert a USB key containing the new software.
5. Use the File Explorer to find the EXE install file on the USB key (normally the **E: Drive**, though this may vary).
6. Double-touch the EXE file to run it. The install program will run and automatically install the new software.
7. Restart the remote display.
8. Verify that the software runs without errors, and that the software version information displayed on the splash screen matches the version you were installing.

   Note: If the installer displays an error message, reboot the remote display and try again.

   If the software displays a critical error when it boots, see *Troubleshooting Errors*.

Upgrading the OS and BIOS Software

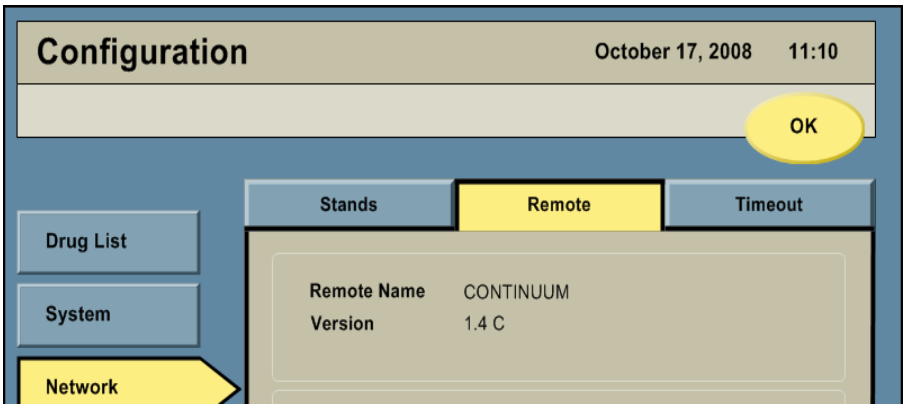
In addition to the application software, the remote display has two other software components. The operating system ("OS") software is a version of XP Embedded customized for MEDRAD. The BIOS software boots the remote display.

Neither the BIOS nor the OS software can be upgraded in the field. The remote must be sent back to MEDRAD for service.

Viewing the Software Version

The remote display software version is displayed on the splash screen when the remote boots. You can also view the software version on the Configuration screen.

1. Power on the remote display.
2. Select the “None” stand.
3. Press the button at the lower right corner of the screen to enter the configuration screen.
4. Select the “Network” section.
5. Select the “Remote” tab. The software version is displayed in the top tab.



The number (“1.4” in the example above) is the version of the application software. The letter (“C” in the example above) is the version of the operating system software. The version of the BIOS software is not displayed anywhere.

If the software version is not for human use, or is for investigational use only, an appropriate warning will be displayed both on the splash screen and the Remote Information screen.

Configuring the Certo Network Settings for Wireless Operation

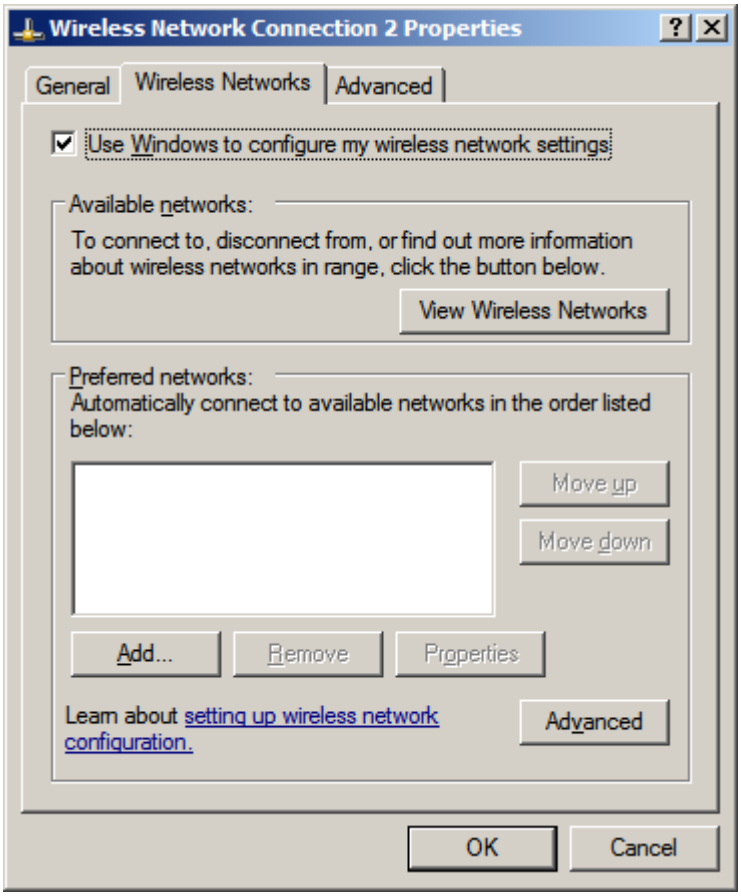
The remote display’s wireless card must be configured with the site-specific Certo network settings.

Note: It is recommended that you have a mouse and keyboard connected for this configuration.

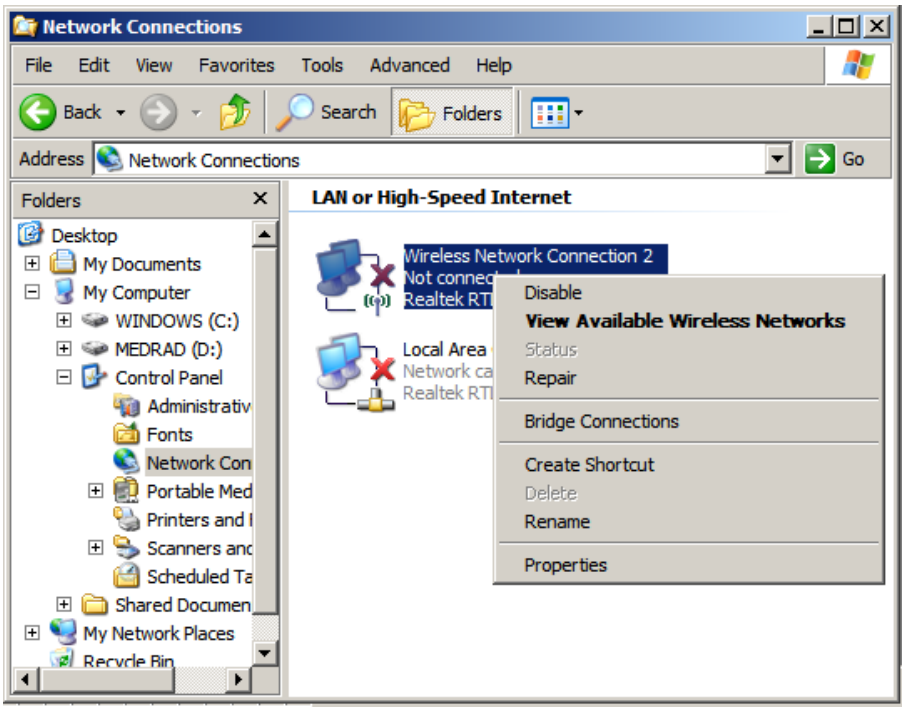
Configure the SSID

The first step is to configure the remote display to use the SSID of the site's Certo network.

1. Disable the hard drive protection feature as explained in *Enabling and Disabling the Hard Drive Protection Feature*.
2. Access the Windows Control Panel as explained in *Accessing the Operating System*.
3. Double click "Network Connections".
4. Select "Wireless Network Connection".
5. Right click, select "Enable" (if already enabled, first select "Disable" and then "Enable")
6. Right click, select "Properties".
7. Select the "Wireless Networks" tab.
8. Select each of the listed "Preferred networks" and click "Remove" (do this until the box is empty as shown in the picture below)
9. Click "OK" to close the dialog box



10. Right click, select “View Available Wireless Networks”



11. Select the SSID of the site’s Certo Network and click “Connect”. (It may warn you that you are connecting to an unsecure network, click “Connect Anyway”.)

    Note: If the Certo network is not setup to broadcast the SSID, it will not appear in the list. You must manually configure the wireless network properties as follows: right click, click properties, enter the desired SSID, Net Auth: open, Data Encryption: disabled, click OK.

12. The remote will indicate that it is connected to the Certo Network (as shown below); close the dialog box by clicking the X in the upper right corner.

Wireless Network Connection 2
Network Tasks
Refresh network list
Set up a wireless network for a home or small office
Choose a wireless network
Click an item in the list below to connect to a wireless network in range or to get more information.
CERTOC
Connected
Unsecured wireless network

Configure the IP Addresses

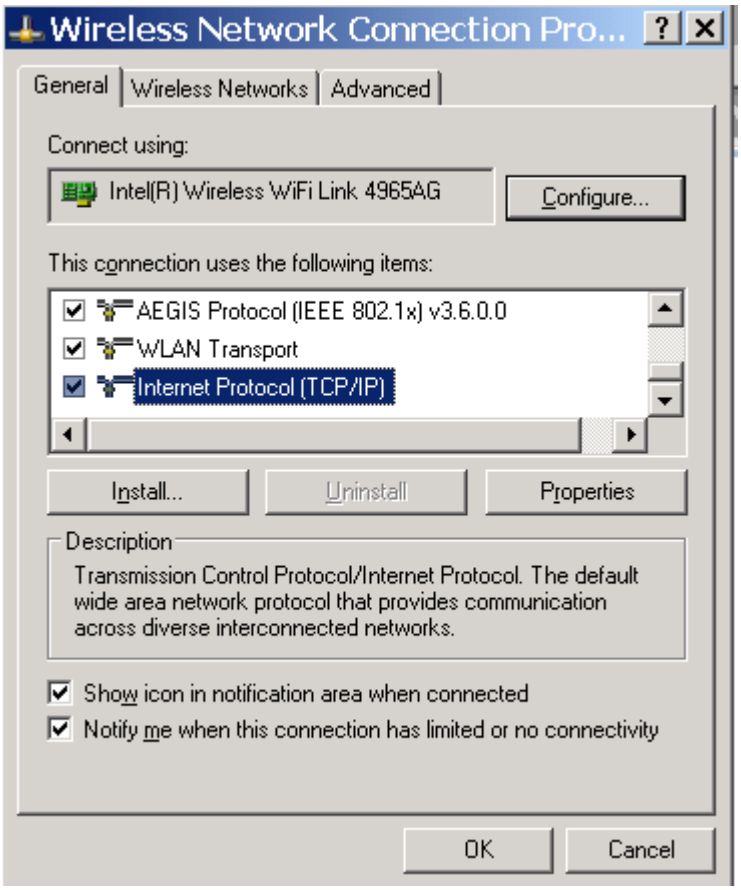
The next step is to configure the IP Address for the remote display’s Ethernet cards. There are two cards: one for the wireless connection and one for the wired connection (used primarily for service), therefore there are two IP Addresses.

Note: The first three parts of the IP addresses must match the Certo module's IP address. For example: if the Certo module is 192.169.1.1, the IP address must be 192.169.1.XXX.

Note: The IP addresses must be unique. Make sure there are no address conflicts with other devices on the Certo network devices (such as Veris patient monitors).

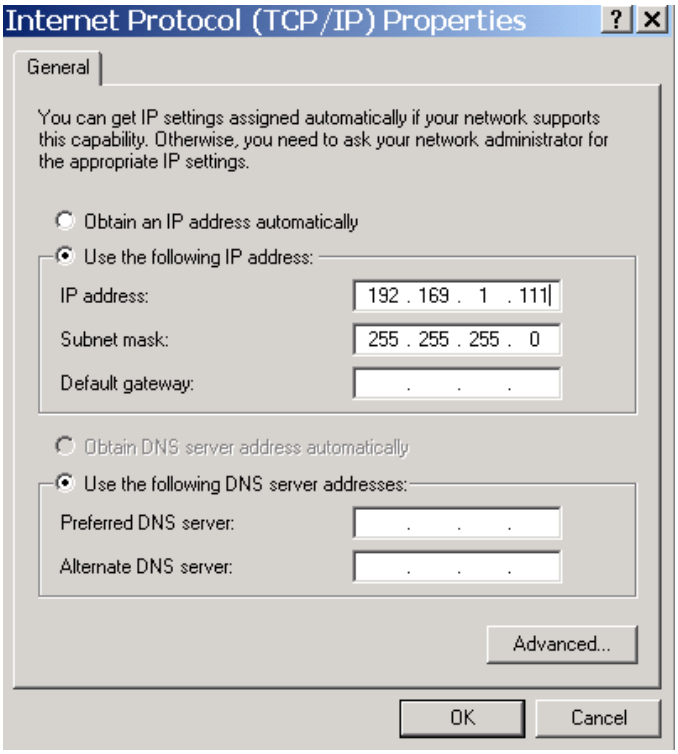
Note: The remote display comes configured by default with addresses of 196.169.1.111 (Wireless) and 192.169.1.112 (Wired). If these addresses are acceptable, you may skip this step.

1. Disable the hard drive protection feature as explained in Enabling and Disabling the Hard Drive Protection Feature.
2. Access the Windows Control Panel as explained in Accessing the Operating System.
3. Select "Network Connections".
4. Select "Wireless Network Connection".
5. Select "Properties".



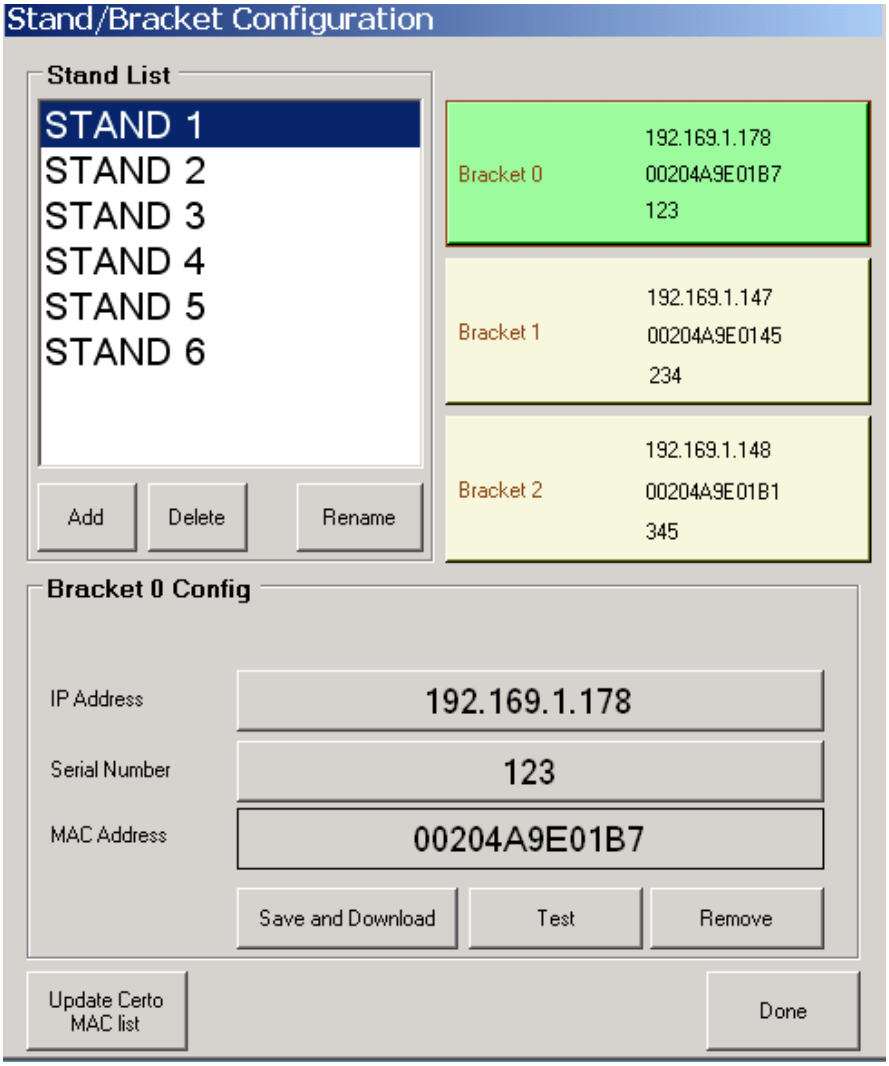
6. Select Internet Protocol (TCP/IP) from the list and click "Properties".
7. Set the IP address to the desired IP.
8. Set the subnet mask to "255.255.255.0".
9. The DNS properties are not used.

10. Click OK.
11. Click CLOSE.
12. Repeat steps 5 through 11 for the wired adapter (Local Area Connection on the Network Connections list.) Reboot the display.
13. The prompt, “Enable hard drive protection?” will appear. If no other changes are to be made select YES. If additional changes are required, select NO.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 169 . 1 . 111
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Configuring Stands and Brackets

You can access the stand configuration screen through the remote display's service screen. From here, you can add, change, or remove stands and brackets.



The list in the upper left displays all of the currently configured stands and buttons to add, rename or delete a stand.

Touch any stand to display the brackets (with their IP and MAC addresses) on the right.

Touch one of the bracket buttons and the bottom box to view, configure or test that bracket.

WARNING: Ensure that the remote display's stand configuration matches the physical placement of the brackets on the stands. The stands and brackets are configured to the Remote Display and are controlled according to the configuration. Always check and update (if necessary) the Remote Display configuration after moving a bracket. Serious injury to the patient may result if a pump in the wrong bracket is controlled through the Remote Display.

Note: There are always three "slots" for brackets – 0, 1 and 2. If a stand has fewer than three brackets, the unused bracket slots will display "Not configured". You can still press that bracket button to configure a new bracket.

Note: The "None" stand is special, and may not be changed or removed.

Adding a Stand

To add a new stand:

1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select "Stand Configuration" on the "Remote Settings" tab.
3. Press the "Add" button under the stand list.
4. Enter a name for the new stand using the on-screen keyboard.
5. Affix a Stand Identification Label (205549) to the top of the stand.

Note: Stands should normally be identified by number (e.g., "Stand 1") to correspond to the stand identification labels. If you use an alternate name, you can use one of the blank stand labels and write in the stand name using a bold, permanent marker.

Initially the stand will show all three brackets as "Not configured". Add brackets as explained in *Adding a Bracket*.

Removing a Stand

To remove a stand:

1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select "Stand Configuration" on the "Remote Settings" tab.
3. Select the stand in the stand list.
4. Press the "Delete" button.
5. Answer "Yes" to confirm you wish to delete the stand.

Adding a Bracket

Adding a bracket requires that you first have a stand (see *Adding a Stand*). To add a bracket to a stand:

1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select "Stand Configuration" on the "Remote Settings" tab.

3. Select the stand in the stand list.
4. Press one of the bracket buttons that shows “Not Configured”.

   Note: Always add brackets in order (0, 1, 2) corresponding to their position on the stand.
   0 = top, 1 = middle, 2 = bottom.

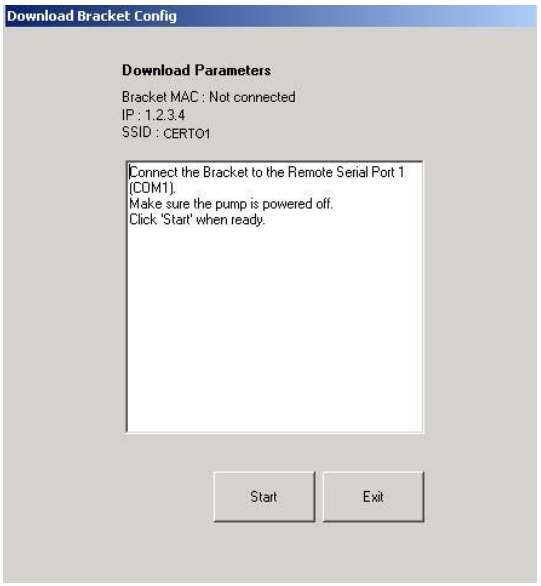
5. Press the IP Address button.
6. Enter the bracket’s IP address using the on-screen keyboard.

   Note: The first three parts of the IP address must match the Certo module’s IP address. For example: if the Certo module is 192.169.1.1, the IP address must be 192.169.1.XXX.

   Note: The remote display must be connected to the Certo network **before** you can configure a bracket. The remote must have an SSID shown on the Configuration screens Network, Remote tab.

   Note: The IP address must be unique. Make sure there are no address conflicts among other on the Certo network devices (such as Veris patient monitors).

7. Press the Serial Number button.
8. Enter the bracket’s serial number using the on-screen keyboard.
9. Click the “Save and Download” button to display the bracket download window.



10. Connect the bracket to the remote display’s serial port using the null modem serial cable obtained from MEDRAD Service (reference number 3012787). Other serial cables may not have the necessary signals (the DCE line) enabled to function properly.

    Note: Only COM1 on the remote display may be used to configure a bracket (the other 3 com ports will **not** work). Refer to 7 -Assembly

Drawings for the location of COM1.

Note: It is probable that a USB-to-Serial adapter will not work to configure a bracket due to the need for the DCE line, always use the Remote Display's COM1.

11. Make sure the pump is either not in the bracket or is powered off.
12. Press "Start" to begin downloading the configuration parameters to the bracket.
13. When the download is complete, disconnect the serial cable.

Note: The bracket's IP address and serial number will NOT be saved unless the download completes successfully.

14. Repeat the above steps for all the brackets being configured.
15. After **all** brackets have been configured, press "Update Certo Mac List" on the stand configuration screen. This will automatically add the MAC addresses of each bracket to the permitted MAC list of any Certo module the remote display knows about (see *Adding a Certo Module*.)

WARNING: DO NOT modify the Certo network configuration while other Certo devices are in use. Adjusting Certo configuration parameters may cause an interruption in network service and adversely impact other devices using the Certo network.

Note: If the MAC address update fails, try again. If the failure persists, you will have to manually add the MAC addresses of the brackets to the permitted MAC lists of each Certo module. Refer to the Certo operation manual for details.

16. Power on the pumps in every bracket.
17. Select each bracket on the stand configuration screen and press the "Test" button. Make sure the correct bracket flashes. This indicates that the remote is able to communicate with the bracket.

Note: If the bracket fails to flash, or the test displays an error, verify that the IP address was entered correctly and attempt the configuration again. If the problem persists, see the *Troubleshooting Network Issues* section for more possible problems.

18. Install the brackets onto the stands, taking care to make sure that they are placed in the proper positions (top/middle/bottom). Use the bracket serial numbers to verify that the brackets are in the proper positions according to the stand configuration information.
19. Test each bracket once more to verify that the brackets are positioned properly.

Replacing a Bracket

To replace a wireless bracket with a new one:

1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select “Stand Configuration” on the “Remote Settings” tab.
3. Select the stand that contains the bracket.
4. Select the bracket that is being replaced.
5. Press “Remove” to remove the old bracket’s configuration.
6. Add and test the replacement bracket as explained in *Adding a Bracket*. Make sure to put the replacement bracket in the same position (top/middle/bottom) as the old bracket.

Reconfiguring a Bracket

At any time, you can re-configure a bracket. This is necessary if you need to change the IP address of a bracket or if the Certo network’s SSID has been changed.

To reconfigure a bracket:

1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select “Stand Configuration” on the “Remote Settings” tab.
3. Select the stand that contains the bracket.
4. Select the bracket.
5. If you want to change the IP address, press the IP address button and enter the new IP address.
6. Press the Download button and follow the instructions in *Adding a Bracket* (beginning at step 10) to download the configuration data to the bracket.

Removing a Bracket

Normally brackets will be replaced rather than removed completely. See *Replacing a Wireless Bracket* for details. If a bracket is removed from the stand, you must clear the old bracket configuration and start from scratch to ensure that the brackets are configured in their proper positions.

1. 1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select “Stand Configuration” on the “Remote Settings” tab.
3. Select the desired stand in the stand list.
4. Select each bracket and press “Remove” to remove its configuration. Add the remaining brackets back to the stand configuration as explained in *Adding a Bracket*.

Note: If the bracket you’re removing is the bottom bracket on a stand, you can simply clear that bracket’s configuration and leave the others alone.

Testing a Bracket

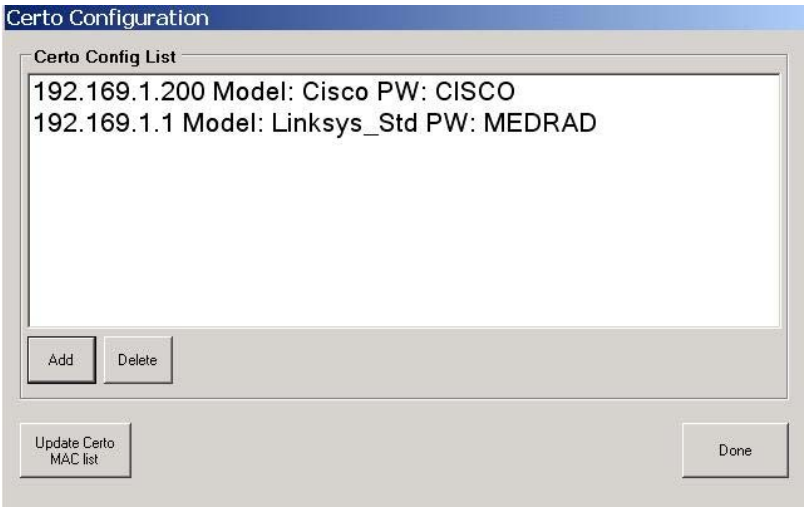
The remote display provides a test feature to make sure that brackets have been placed in the appropriate positions on the appropriate stands. To test a bracket:

1. Make sure the pump is in the bracket and powered on.
2. Go to the service screen as explained in *Accessing the Service Screen*.
3. Select “Stand Configuration” on the “Remote Settings” tab.
4. Select the desired stand in the stand list.
5. Select the desired bracket.
6. Press the “Test” button. The bracket’s Wireless Status LED should briefly light green to indicate “Remote Active” and the pump’s backlight should flash for a few seconds.

Note: If the bracket fails to flash, or the test displays an error, see the *Troubleshooting Network Issues* section.

Updating Certo’s Permitted MAC List

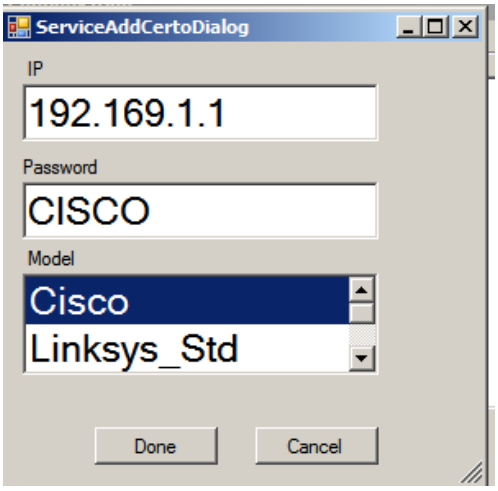
The remote display provides some convenience features for automatically updating the “permitted MAC address” lists on the Certo modules. In order to do this, you must configure the remote display to know what Certo modules are on the network.



Adding a Certo Module

To add a Certo module to the remote display's module list:

1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select "Certo Configuration" on the "Remote Settings" tab.
3. Press the "Add" button.



4. Touch the IP box.
5. Enter the IP address of the Certo module.
6. Touch the Password box.
7. Enter the password used to access the administration webpage on the Certo module.

   Note: The Certo password may **not** contain any lowercase letters. If it does, change the password on the Certo module before attempting to add it to the remote display. See the Certo manual for instructions.

8. Select the Model of the Certo Module (Cisco, Linksys_Std, or Linksys_DDWRT). Linksys_Std is for standard Linksys routers. Linksys_DDWRT is for Linksys routers running the special DDWRT firmware.
9. Select "Done".
10. If you have already configured stands and brackets, add the existing bracket MAC addresses to the new module (see *Adding MAC Addresses to the Certo Module*.)

Removing a Certo Module

To remote a Certo module from the remote display's module list:

1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select "Certo Configuration" on the "Remote Settings" tab.
3. Select the IP address of the module you want to delete.
4. Press the "Delete" button.

Adding MAC Addresses to the Certo Module

The remote display can automatically add all the MAC addresses it knows about (for the remote display itself, as well as any brackets that have been configured) to every module on its Certo configuration list. To add MAC addresses to the modules:

1. Ensure that all the Certo modules are powered on and connected together via fiber-optic or Ethernet cable.

   Note: The very first time you attempt to update the Certo modules, you will have to either

   a) Connect the remote display to one of the modules using an Ethernet cable
   or
   b) Manually add the MAC address of the remote display's wireless Ethernet adapter to the permitted MAC list of the control room module.

   Otherwise the remote display will not be able to talk to the Certo module. Once the remote display's MAC address is on the permitted list, it can add all the other addresses for stands and brackets.

2. Go to the service screen as explained in *Accessing the Service Screen*.
3. Select "Certo Configuration" on the "Remote Settings" tab.
4. Press "Update Certo MAC list". The remote display will attempt to update the MAC list of every module in its configuration list.

WARNING: DO NOT modify the Certo network configuration while other Certo devices are in use. Adjusting Certo configuration parameters may cause an interruption in network service and adversely impact other devices using the Certo network.

Note: If the MAC address update fails, try again. If the failure persists, you will have to manually add the MAC addresses of the brackets to the permitted MAC lists of each Certo module. Refer to the Certo operation manual for details.

Calibrating the Touchscreen

If the remote display's touchscreen begins to "drift" (i.e. touches are registered a small distance away from the point where your finger touched), it may be necessary to re-calibrate the touchscreen. Performing touchscreen calibration as part of annual maintenance can help prevent the touchscreen from drifting.

In software version 2.0 and newer, the user will be able to calibrate the touchscreen. For older software versions, follow the instructions below to calibrate the touchscreen:

1. Disable the Hard Drive Protection feature as explained in *Enabling and Disabling the Hard Drive Protection Feature*.
2. Go to the service screen as explained in *Accessing the Service Screen*.
3. Select “Touchscreen Calibration” under the “Windows Settings” tab.
4. Follow the prompts on-screen to calibrate the touchscreen.
5. Reboot the remote display and re-enable the Hard Drive Protection feature.

Downloading Event Logs

Engineers may request an event log from the remote display for data collection and/or debugging purposes. This log is not intended for use by field service technicians.

To download the remote’s event log:

1. Go to the service screen as explained in *Accessing the Service Screen*.
2. Select “Copy Log Files to Disk” from the “Misc” menu.
3. Insert a USB key.
4. Select a location on the USB key where the log should be stored.

Copying Configuration Data to another Remote or saving the file as a back-up

For sites with multiple remote displays, it may be convenient to copy the configuration data (for stands, brackets, Certo modules, and settings) from one remote to another.

To copy configuration data from *Remote A* to *Remote B*:

1. Insert a USB key into *Remote A*.
2. Go to the service screen of *Remote A* as explained in *Accessing the Service Screen*.
3. Select “Export Configuration” on the “Remote Settings” tab.
4. Select a location on the USB key to store the data.
5. Remove the USB key and put it into *Remote B*.
6. Go to the service screen on *Remote B*.
7. Select “Import Configuration” on the “Remote Settings” tab.
8. Select the location on the USB key where the data from *Remote A* was stored. The remote display will import that data.
9. Saving the file as a back-up can be done in the same manner as above. Copy the back-up file to a destination that is easily retrievable.

Note: Importing configuration data will **overwrite** any existing data on the target remote display.

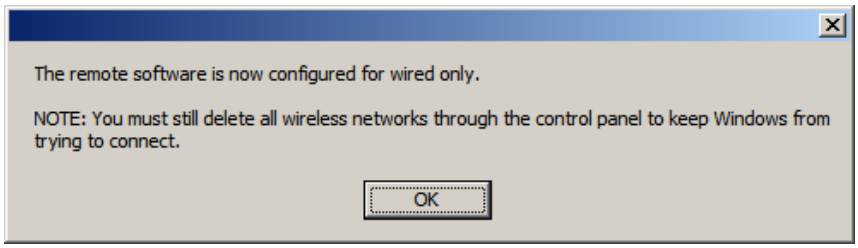
Configuring the Remote for Hardwire Connection

All Remote Displays are initially configured for wireless communication. It may be desired to configure the remote with a hardwired ethernet connection instead of using the wireless communication utility. This will allow the Remote to communicate with the Certo module over an ethernet cable.

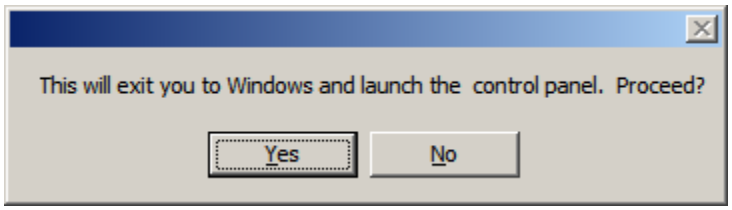
To configure the Remote with a hardwired ethernet connection:

1. Disable the hard drive protection as explained in *Enabling and Disabling the Hard Drive Protection Feature*.

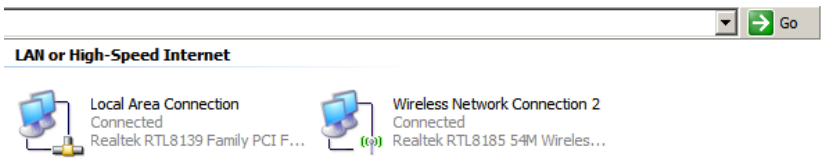
2. Go to the Service screen.
3. Select “Enable Wired-Only”.
4. The following screen will appear.


The remote software is now configured for wired only.
NOTE: You must still delete all wireless networks through the control panel to keep Windows from trying to connect.
OK

5. Click OK.
6. In the Service screen select “Windows Settings”.
7. Select “Control Panel”.

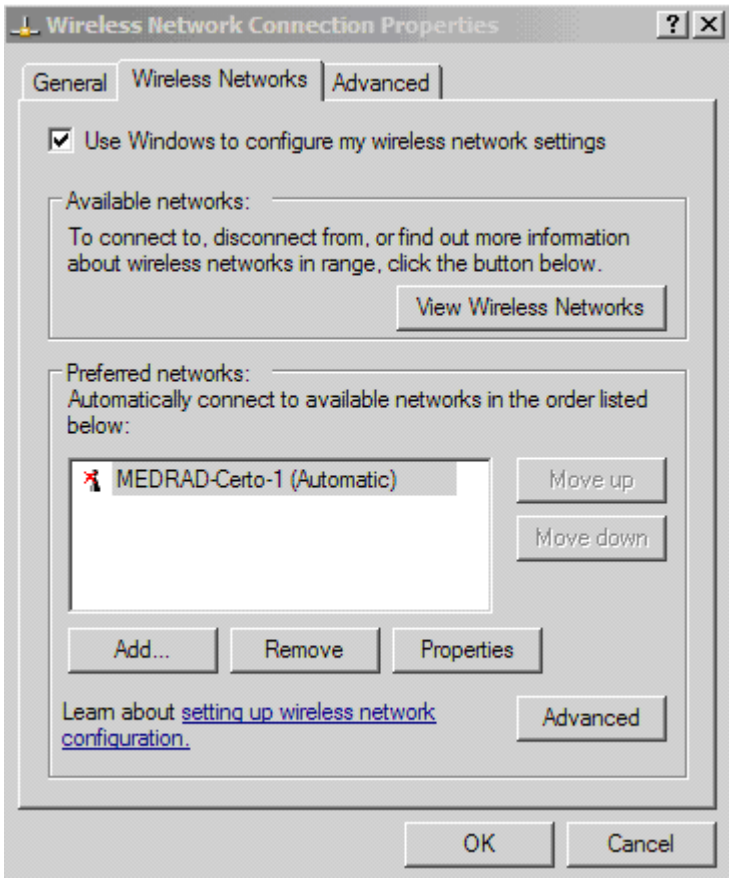


8. Select “Network Connections”.



9. Using a mouse, right-click on the “Wireless Network Connection” icon, or select it and choose “File | Properties” from the menu if no mouse is available

10. Select “View Available Wireless Networks”.



11. **Remove** all listed networks. (The “Preferred networks” list above should be empty).
12. Select “Ok”. The “Wireless Network Connection Properties” screen will disappear.
13. Reboot the remote display.
14. Re-enable the hard drive protection when prompted.

To re-enable wireless operation:

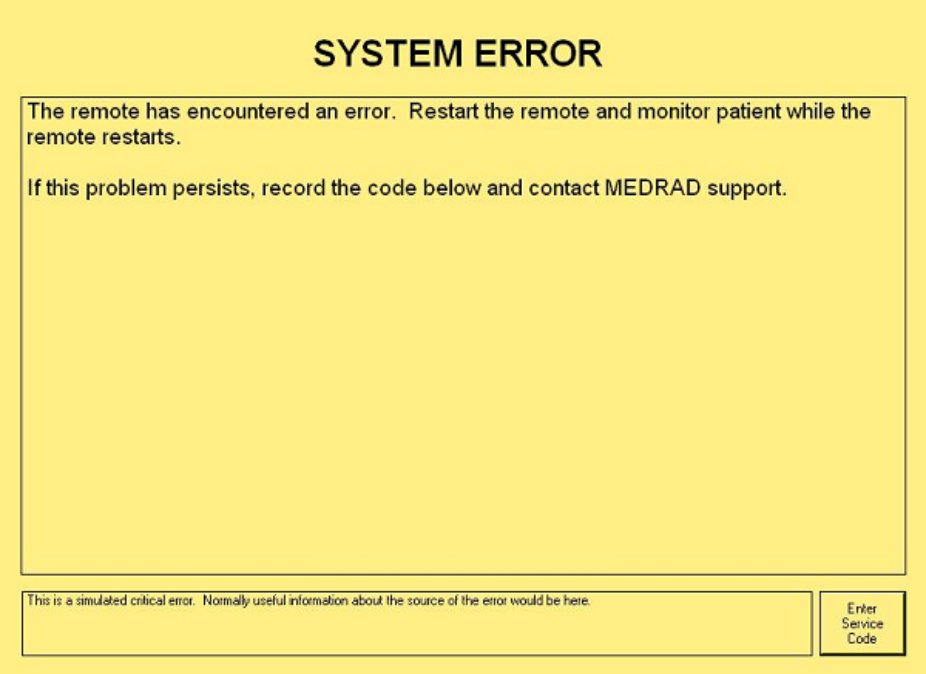
1. Disable the hard drive protection as explained in *Enabling and Disabling the Hard Drive Protection Feature*.
2. Go to the Service screen.
3. Select “Disable Wired-Only”.
4. The following screen will appear.

The remote software is now configured for wireless.
NOTE: You must still add wireless networks through the control panel to allow Windows to connect.
OK

5. Click OK.
6. Re-configure the Certo network SSID as explained in *Configure the SSID*.

Troubleshooting Errors

Critical errors reported by the remote display are generally software failures, either of the application software or the operating system software. Because of this, there are no error codes or FRU indications on the remote display's critical error screen.


SYSTEM ERROR
The remote has encountered an error. Restart the remote and monitor patient while the remote restarts.
If this problem persists, record the code below and contact MEDRAD support.
This is a simulated critical error. Normally useful information about the source of the error would be here.
Enter Service Code

Note: The error description at the bottom of the screen is intended to aid engineering in identifying the issue, and is probably not useful for field service.

To recover from a critical error:

1. Press the "Enter Service Code" button on the error screen.
2. Enter the service code. This will exit the application software and take you to Windows File Explorer.
3. Re-install the application software as explained in *Installing or Upgrading the Application Software*.

If the error occurs at startup and persists after re-installing the software, it may be due to corrupted configuration files. Deleting the configuration files may fix the problem:

1. Enter the service code again to display the File Explorer.

2. Copy the contents of the **D:/RemoteSoftware/Data/Config** directory onto a USB key for safekeeping.
3. Delete the contents of the **D:/RemoteSoftware/Data/Config** directory.
4. Re-install the application software once more.
5. Since you deleted the configuration files, you'll have to redo all of the user's configuration information (stands, brackets, Certo modules, and settings.)

If the problem still persists even after deleting the configuration files, contact MEDRAD to return the remote display for service.

Troubleshooting Network Issues

This section will help you troubleshoot when the remote display is not able to communicate with a bracket.

Note: The information in this section is intended for situations where you cannot connect to a bracket **at all**. For intermittent communication failures, see *Wireless Diagnostic Tools*.

Troubleshooting Remote Display Communication Issues

The first thing to check is that the remote display is communicating with Certo. On the lower left corner of the remote display's **main screen** is its Certo network status indicator. The table below shows the possible values of the indicator and various troubleshooting options for each.

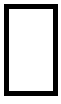
Status Indicator	Meaning	Remedy
	Remote display is connected to Certo and is actively communicating with at least one other bracket.	Make sure the proper stand is selected for the bracket with which you cannot communicate. Check the stand configuration to ensure that it contains the expected brackets. *See Configuring Stands and Brackets*. Check that the bracket is functioning. See *Troubleshooting Bracket Communication Issues*.
	Remote display is connected to Certo but not to any brackets.	Same as above.
	Remote display is not connected to Certo.	Reboot the remote display. Make sure the remote display's MAC address is in the permitted MAC list of all the Certo modules. See *Updating Certo's Permitted MAC List*. Check the remote display's Certo network settings, especially the SSID. See *Configuring the Certo Network Settings*. Ensure the remote display is within range of the Certo module. Check that the Certo network is functioning. See *Troubleshooting Certo Issues*.

Note: If the Remote Display will not keep a reliable wireless connection to the Certo network, you may switch it to use a wired Ethernet connection. See *Configuring the Remote for Hardwire Connection*

Troubleshooting Bracket Communication Issues

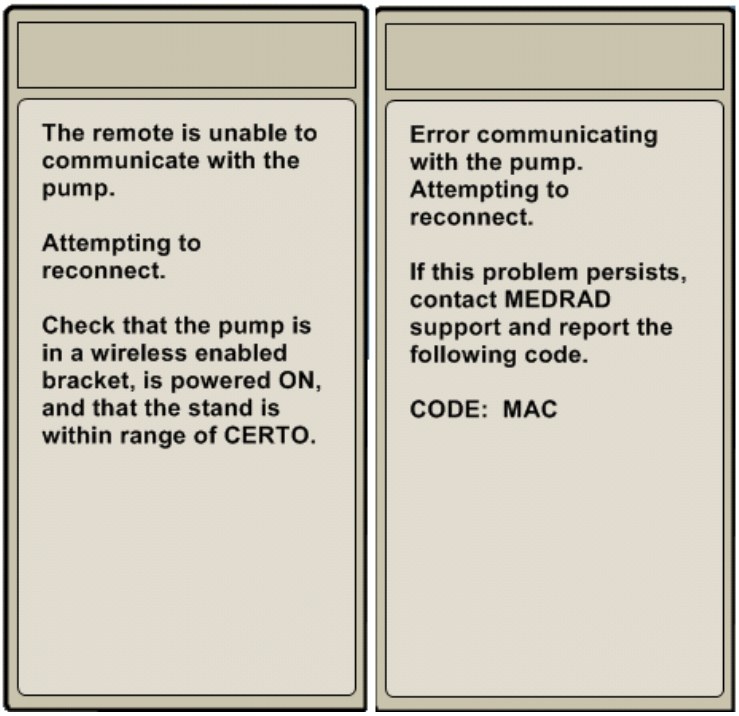
If the remote display is communicating with Certo but cannot connect to a bracket, check the bracket's Certo status indicator. The following table describes various troubleshooting options depending on the status of the indicator.

Status Indicator	Meaning	Remedy
Solid green	The bracket is communicating with a remote display.	Make sure another remote display isn't trying to control the bracket. Only one remote display can connect to a bracket at a time.
Indicates green for ~1second then yellow	The bracket is communicating with the remote display **but** the network latency is longer than 1 second.	The wireless network is either experiencing interference or heavy traffic. If the remote is experiencing communications dropouts you may lengthen the Timeout value (2, 3 or 4 seconds) this will alleviate the dropouts, but the bracket LED will remain as is. If the remote is not experiencing dropouts, no action is needed. Refer to the Certo Installation and Service manual for options.

Status Indicator	Meaning	Remedy
 Solid Yellow	The bracket is connected to the Certo network, but is not communicating with a remote display.	Make sure the pump is in the bracket and powered on. Check that the remote display is connected to Certo and is trying to control the proper stand. See *Troubleshooting Remote Display Communication Issues*. Check the remote display's status indication for the affected bracket to see if there is a specific communication failure. See *Understanding Remote Display Communication Status Messages*. Check that the remote display's stand configuration contains the bracket. *See Configuring Stands and Brackets*. Restore the bracket's configuration settings in case the bracket was mis-configured. See *Reconfiguring a Bracket*.
 Slow, Periodic Flashes, every 10-20 seconds	The bracket is seeking a network connection but hasn't found one.	Make sure the pump is in the bracket and powered on. Make sure the bracket is in range of the Certo network. Restore the bracket's configuration settings in case the bracket was mis-configured. See *Reconfiguring a Bracket*.
 Fast, Constant Flash	The bracket has found the Certo network but cannot connect.	Make sure the pump is in the bracket and powered on. Make sure the bracket's MAC address is in the permitted MAC list of all the Certo modules. See *Updating Certo's Permitted MAC List*.
 Off	Wireless is disabled.	Make sure the pump is in the bracket and powered on. Make sure the bracket battery is installed and charged.

Understanding Remote Display Communication Status Messages

The remote display will show a status message in the pump information panel when it has trouble communicating with a bracket.


The remote is unable to communicate with the pump.
Attempting to reconnect.
Check that the pump is in a wireless enabled bracket, is powered ON, and that the stand is within range of CERTO.
Error communicating with the pump. Attempting to reconnect.
If this problem persists, contact MEDRAD support and report the following code.
CODE: MAC

Error Code	Meaning	Remedy
No error code	When there is no error code displayed, the remote display cannot connect to the bracket at all.	See the other troubleshooting sections.
MAC	The remote display is expecting a bracket with a different MAC address. This happens when multiple brackets are mistakenly configured with the same IP address.	Remove the incorrect bracket from the remote display's stand configuration and replace it with the correct one. See *Replacing a Bracket*.
Version	The pump is running an incompatible firmware version.	Upgrade the remote display to the latest software version. See *Installing or Upgrading the Application Software*. If the problem persists, replace the pump.
Other errors	Either the pump or bracket is causing communication errors.	If a different pump is available, try it in the same bracket. If the problem persists with a different pump, replace the bracket. Otherwise, replace the pump.

Troubleshooting Certo Issues

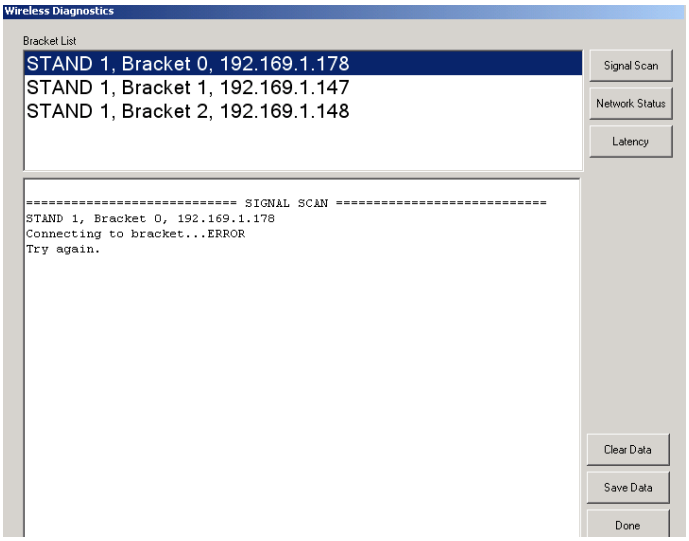
If the remote and brackets cannot communicate, it is possible that the Certo network itself is not functioning. Refer to the Certo Installation and Service Manual for more information.

1. Ensure that the Certo modules are powered on and connected to each other.
2. Check whether other devices on the network are functioning properly. If they are not, it is likely a problem with Certo itself.
3. Check the Certo configuration to make sure wireless is enabled and the SSID and IP address are what you expect.
4. Check the Certo's permitted MAC list to make sure the remote display and all the brackets are on the list. Make sure the MAC list is set to "*permit* the listed addresses" and NOT "*prevent* the listed addresses".
5. Attempt to ping the Certo router using a service laptop.

Wireless Diagnostic Tools

The remote display offers several tools to assist with wireless diagnostics.

Note: All of these tools acquire information from the bracket, and are intended for diagnosing intermittent problems believed to be caused by poor network conditions. **If you cannot connect to the bracket at all, see *Troubleshooting Network Issues*.**



- **Signal Scan** – Reports what wireless access points the bracket can see. This is a "site survey" from the brackets point of view.
- **Network Status** – Reports on the access point that the bracket is currently connected to and communicating through.
- **Latency Test** – Measures communications latency between the remote and the bracket.

To access any of these tools:

1. Go to the service screen as explained in *Accessing the Service Screen.*
2. Select “Wireless Diagnostics” from the “Misc” tab.
3. Press the button corresponding to the diagnostic you want to run.
4. If you want to save the data to a file, click the Save Data button and select a location (usually a USB key or the D: drive) to save the data.
5. If you want to clear the data, click the Clear Data button.

More information about the data obtained with each diagnostic is explained below.

Signal Scan Tool

The Signal Scan Tool reports information about all wireless access points the bracket can see. The data includes:

- **MAC** – MAC address
- **Ch** – Channel number
- **Strength** – Signal strength
- **Mode** – Network mode (infrastructure, ad-hoc, etc.)
- **Security** – Wireless security setting (WEP, none, etc.)
- **SSID**

Network Status Tool

The Network Status Tool is similar to the Signal Scan Tool, but it reports information about the wireless access point that the bracket is currently connected to. The data includes:

- **BSSID** –MAC address of the access point with which the bracket is associated.
- **Channel** – Channel number
- **RSSI** – Signal strength
- **Topology** – Network mode (infrastructure, ad-hoc, etc.)
- **Authentication** – Security mode (WEP, none, etc.)
- **SSID**

Latency Test

The Latency Tool sends a number of messages to the pump and measures the round-trip latency. It reports on the minimum, maximum and average latency times.

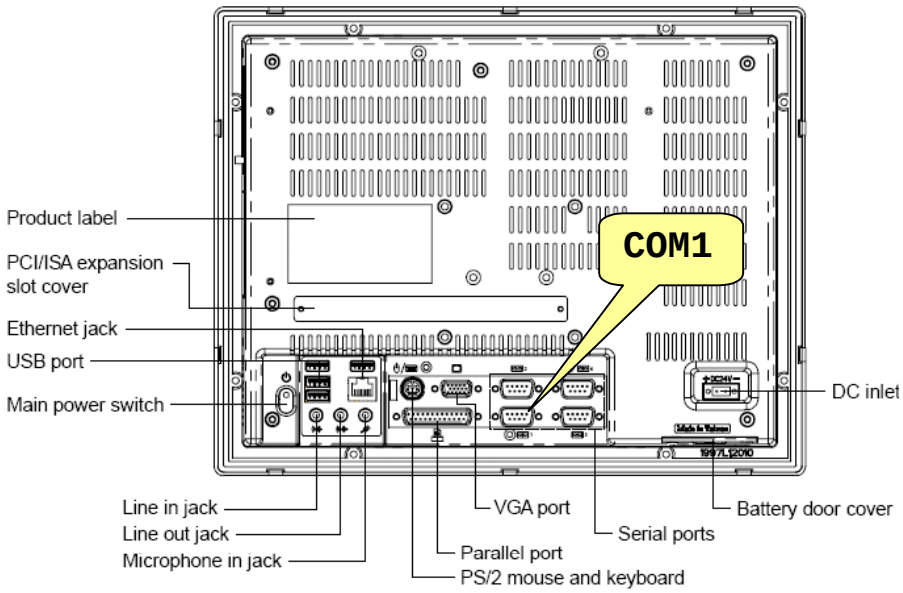
Periodic Maintenance

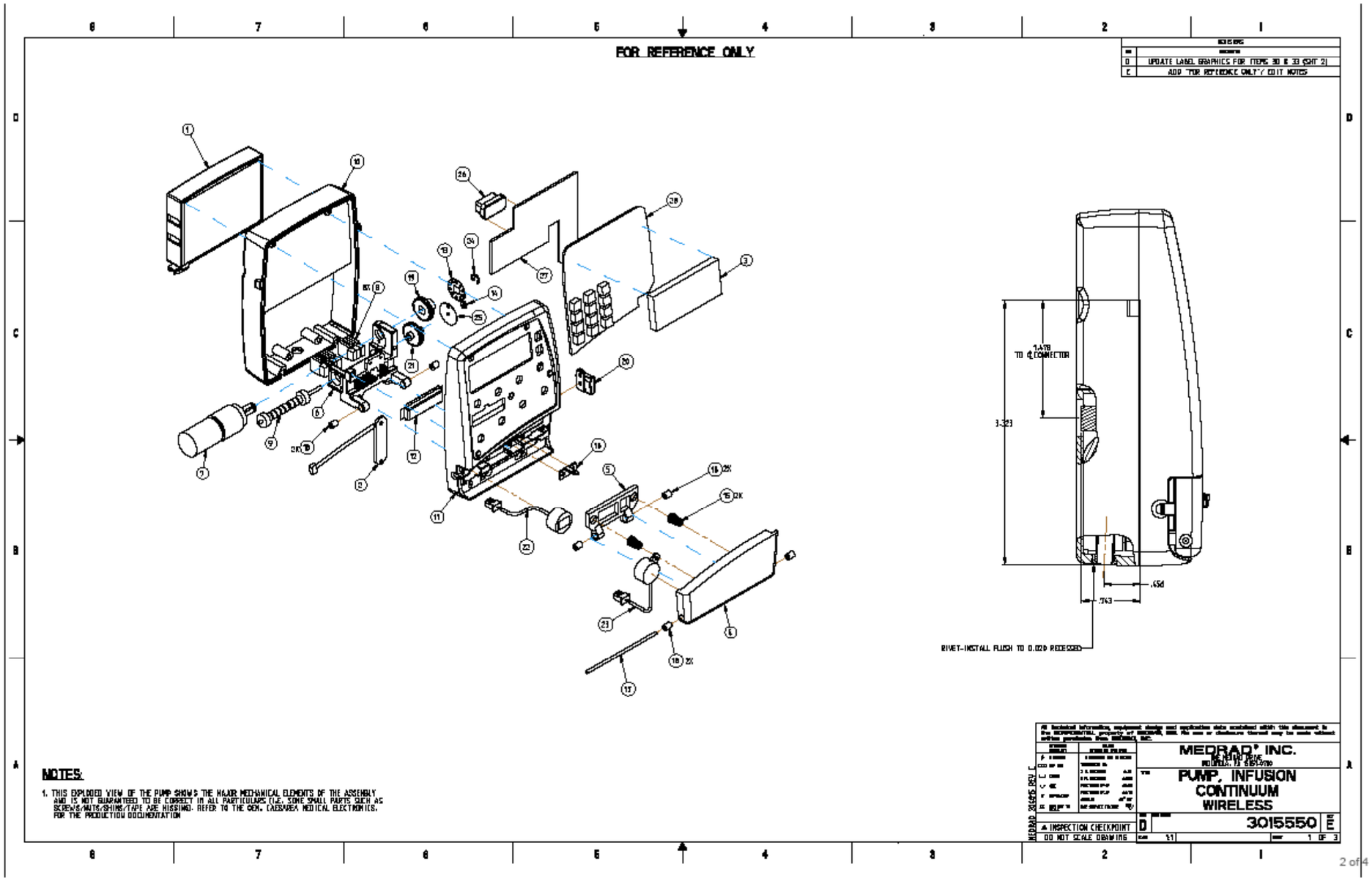
The remote display’s touchscreen should be calibrated on an annual basis as described in *Calibrating the Touchscreen*.

7 - Assembly Drawings

The following drawing shows connections on the rear of the remote display. In particular note the USB ports and the serial ports.

Note: Only COM1 may be used to configure a bracket.

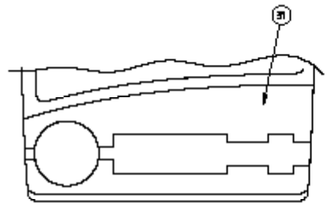



FOR REFERENCE ONLY
D UPDATE LABEL GRAPHICS FOR ITEMS 30 & 33 (SHT 2)
C ADD "FOR REFERENCE ONLY" / EDIT NOTES
1.478
TO QUICONNECTOR
3.323
.650
.743
RIVET-INSTALL FLUSH TO 0.020 RECESSED
NOTES:
1. THIS EXPLODED VIEW OF THE PUMP SHOWS THE MAJOR MECHANICAL ELEMENTS OF THE ASSEMBLY AND IS NOT GUARANTEED TO BE CORRECT IN ALL PARTICULARS (I.E., SOME SMALL PARTS SUCH AS SCREWS/NUTS/SHIMS/TAPE ARE MISSING). REFER TO THE GEN. CASSARA MEDICAL ELECTRONICS, FOR THE PRODUCTION DOCUMENTATION
MEDRAD, INC.
PUMP, INFUSION
CONTINUUM
WIRELESS
3015550
D
INSPECTION CHECKPOINT
DO NOT SCALE DRAWING
1 OF 3

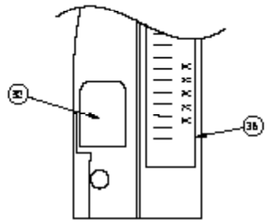
Drawing/Print, 3015550, Rev.E. - Prior to use, you are responsible to confirm that this revision is the latest released revision and to verify accuracy of printed content.

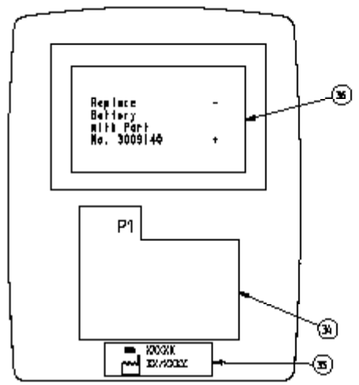
Drawing/Print, 3015550, Rev.E - Prior to use, you are responsible to confirm that this revision is the latest released revision and to verify accuracy of printed content.

SEE SHEET 1 FOR REVISION INFORMATION

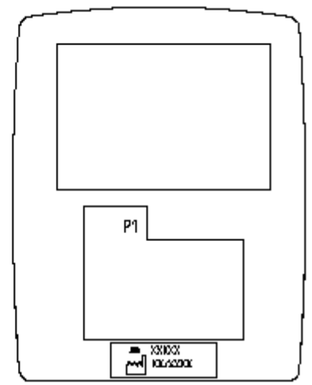


VIEW INSIDE FRONT PANEL

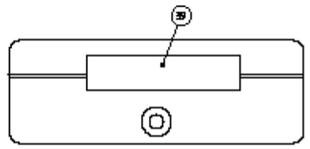




REAR VIEW
BATTERY PACK REMOVED



VIEW OUTSIDE
BATTERY PACK INSTALLED



NOTES:

2. CERTIFICATE OF COMPLIANCE (COC#TBD) OF EACH DEVICE SHALL BE PROVIDED
3. REFER TO DP-103748 FOR DETAILED REQUIREMENTS SPECIFICATIONS
4. PACKAGE EACH INDIVIDUAL PUMP PER DOCUMENT DM-3008176 TO ENSURE THAT THE PROPER PACKAGING MATERIALS AND PROCESS SPECIFICATIONS ARE USED AND THAT THE PROPER PRODUCT DOCUMENTATION IS COMPLETED AND ACCOMPANYING EACH PRODUCT
5. BULK OVER PACK THE INDIVIDUALLY PACKAGED PUMPS UTILIZING A CONTAINER WITH FILLER PACKAGING MATERIALS IF NEEDED AND PROCESS THAT WILL PROVIDE SAFE AND UNDAMAGED TRANSPORT AND STORAGE OF THE PRODUCTS AND THEIR PACKAGING MATERIALS TO AND WITHIN MEDRAD

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PUMP, INFUSION
CONTINUUM
WIRELESS

3015550 REV D

INSPECTION CHECKPOINT
DO NOT SCALE DRAWING

SIZE D | SCALE 1:1 | SHEET 2 OF 3

3 of 4

Drawing Print, 3015550, Rev:E - Prior to use, you are responsible to confirm that this revision is the latest released revision and to verify accuracy of printed content.

BILL OF MATERIAL

ITEM	DESCRIPTION	PART NUMBER	MFR NUMBER	MFR NAME	QTY	MATL	NOTES
1	ASSEMBLY, BATTERY, PUMP, CONTINUUM	3009140	400-202XB	CME	1		SEE DF-101803 FOR COMPLETE SPECS
2	SENSOR, PRESSURE MR INF PUMP CONTINUUM	3009156	220-101X	CME	1		
3	LCD DISPLAY PUMP MR INF CONTINUUM	3009157	500-309XA	CME	1		
4	DOOR, PUMP MR INF CONTINUUM	3009158	F251-100X	CME	1		
5	PRESSING PLATE MR INF PUMP CONTINUUM	3009159	300-035X	CME	1		
6	PUMPING BLOCK PUMP, MR INFUSION CONTINUUM	3009161	210-011X	CME	1		
7	MOTOR, DC BRUSH MR INF PUMP CONTINUUM	3009162	200-014X	CME	1		PORTESCAP BRUSHED DC 17N18B-21GE WITH GEARBOX R16
8	PUMPING FINGER MR INF PUMP CONTINUUM	3009163	300-007X	CME	8		
9	EXCENTER, CAM, PUMPING MR INF CONTINUUM	3009164	210-000X	CME	1		
10	HOUSING, REAR PUMP, MR INFUSIDN CONTINUUM	3015969	421-000X	CME	1		VTI COAT INTERIOR. COATING RESISTIVITY 1Ω/SQ. THICKNESS ON ANY COATED SURF .5MICRON MIN.SHIELDED PARTS MUST ADHERE TO UL746C SEC 48.
11	HOUSING, FRONT PUMP, MR INFUSIDN, CONTINUUM	3014673	300-000X	CME	1		VTI COAT INTERIOR. COATING RESISTIVITY 1Ω/SQ. THICKNESS ON ANY COATED SURF .5MICRON MIN.SHIELDED PARTS MUST ADHERE TO UL746C SEC 48.
12	COVER, FINGER, CONTINUUM	3014681	300-019X	CME	1		
13	DISC, ENCODER	3014682			1		
14	NUT, M2	3014683	100-006X	CME	1		
15	SPRING, DOOR	3014684	250-012X	CME	2		
16	HOOK, DOOR	3014685			1		
17	DOOR, SHAFT	3014686	250-251X	CME	1		
18	INSERT	3014687			6		
19	WHEEL, MOTOR, COG	3014915			1		
20	LATCH, DOOR	3014916	250-700X	CME	1		
21	WHEEL, COG, SMALL	3014917			1		
22	SENSOR, AIR, FRONT	3014918	230-00	CME	1		
23	SENSOR, AIR, DOOR	3014919	230-200X	CME	1		
24	C-CLIP, MOTOR	3015001	200-100X (MOTOR ASSY)	CME	1		
25	DISC, CAM				1		
26	5 PAD CONNECTOR				1		
27	PCB, MOTOR MR INF PUMP CONTINUUM WIRELESS	3015966	240-008XH	CME	1		PCB VERSION BGMOTOR4
28	PCB PROCESSOR MR INF PUMP CONTINUUM WIRELESS	3015967	500-572X (MAIN PCB)	CME	1		PCB VERSION BGMAIN10 38.4 KBPS
29	LABEL, FRONT	201515	300-040XP	CME	1		
30	LABEL, MEDRAD	205439	205439	CME	1		
31	LABEL, FLOW DIRECTION	201516	300-013X-M	CME	1		
32	LABEL, LATCH BG	201567	300-057X-323	CME	1		
33	LABEL, PUMP, WARNING	203466	100-402X	CME	1		
34	LABEL, ID, PUMP, CONTINUUM, WIRELESS	205441	205441	CME	1		
35	TAG, SERIAL, CONTINUUM	200299	200299	CME	1		BEGIN SERIAL NUMBER WITH 30001 DATE FORMAT: MM/YYYY
36	LABEL, BATTERY REPLACEMENT	201533	130-002X	CME	1		
37	FIRMWARE, PUMP	DN-208189	DN-208189	CME	1		
38	LABEL, BARCODE	N/A			1		OPTIONAL
39	LABEL, QC APPROVED		400-333X	CAESAREA MEDICAL	1		

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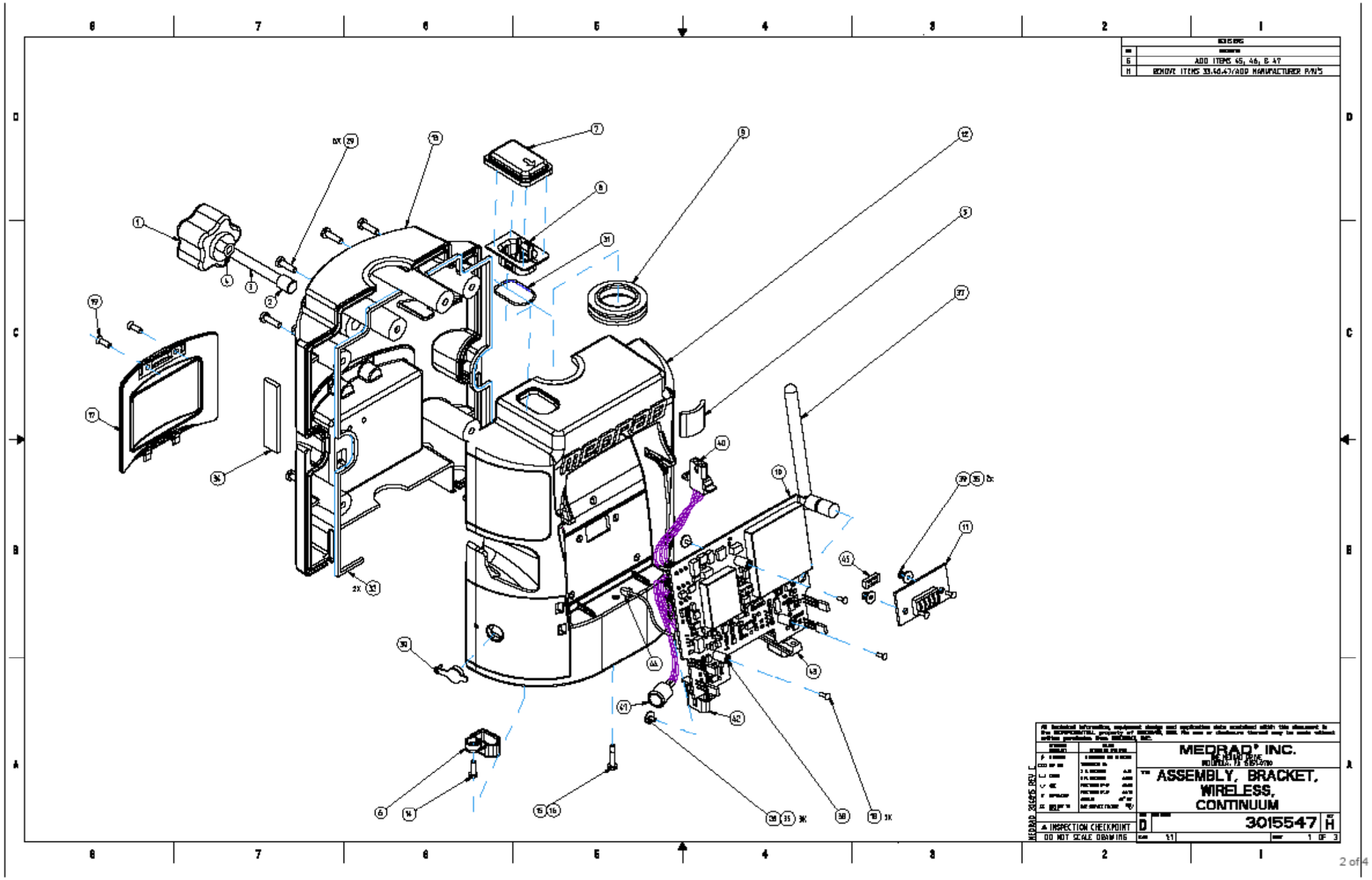
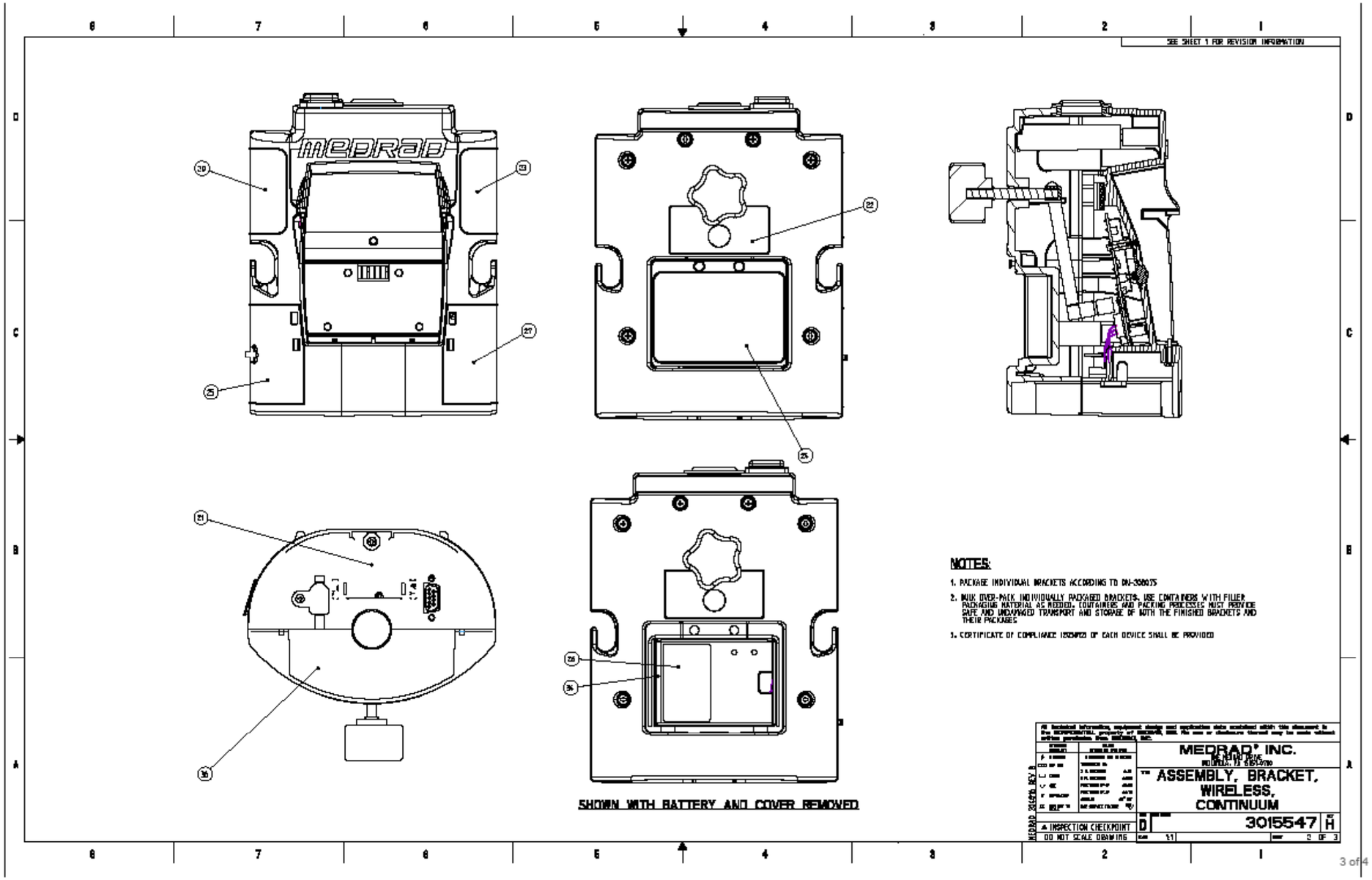
TITLE

PUMP, INFUSION CONTINUUM WIRELESS

DWG NUMBER 3015550 REV E

SEE SHEET 1 FOR REV INFO | SHEET 3 OF 3


REVISIONS
G ADD ITEMS 45, 46, & 47
H REMOVE ITEMS 33,40,47;ADD MANUFACTURER P/N'S
MEDRAD INC.
ASSEMBLY, BRACKET, WIRELESS, CONTINUUM
3015547
H
SIZE D
SCALE 1:1
SHEET 1 OF 3
INSPECTION CHECKPOINT
DO NOT SCALE DRAWING
MEDRAD 3015547, REV H
Drawing Print, 3015547, Rev H - Prior to use, you are responsible to confirm that this revision is the latest released revision and to verify accuracy of printed content.


SEE SHEET 1 FOR REVISION INFORMATION
SHOWN WITH BATTERY AND COVER REMOVED
NOTES:
1. PACKAGE INDIVIDUAL BRACKETS ACCORDING TO DN-350075
2. BULK OVER-PACK INDIVIDUALLY PACKAGED BRACKETS. USE CONTAINERS WITH FILLER PACKAGING MATERIAL AS NEEDED. CONTAINERS AND PACKING PROCESSES MUST PROVIDE SAFE AND UNDAMAGED TRANSPORT AND STORAGE OF BOTH THE FINISHED BRACKETS AND THEIR PACKAGES
3. CERTIFICATE OF COMPLIANCE (DS3MP03 OF EACH DEVICE SHALL BE PROVIDED
MEDRAD® INC.
ASSEMBLY, BRACKET, WIRELESS, CONTINUUM
3015547
H
D
INSPECTION CHECKPOINT
DO NOT SCALE DRAWING
SHEET 3 OF 3

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Drawing Print, 3015547, Rev:H - Prior to use, you are responsible to confirm that this revision is the latest released revision and to verify accuracy of printed content.

BILL OF MATERIAL

ITEM	DESCRIPTION	PART NUMBER	MFR NUMBER	MFR NAME	QTY	MATL	NOTES
1	KNOB, POSITIONING	3008804	61125K11	MCMASTER CARR	1	-	-
2	TIP, THREADED STUD	3008806	3008806	CME	1	POM	-
3	STUD	3008807	3008807	CME	1	BRASS	-
4	O-RING, 009	3008808	9452K17	MCMASTER-CARR	1	BUNA-N	OR EQV
5	PAD, FRICTION, BRACKET	3008935	3008935	CME	1	PU	-
6	COVER, CONNECTOR, CONTINUUM WIRELESS	3016876	3016876	CME		PC/ABS	
7	BOOT, CONNECTOR, CONTINUUM WIRELESS	3015512	3015512	CME	1	TPV	
8	HOLDER, CONNECTOR, CONTINUUM WIRELESS	3015513	3015513	CME	1	PC/ABS	
9	GROMMET, SEAL, BRACKET, CONTINUUM WIRLSS	3015514	3015514	CME	1	TPV	
10	PC BOARD INTERFACE, CONTINUUM WIRELESS	3016062	3016062	CME	1		
11	PC BOARD CONNECTOR, CONTINUUM WIRELESS	3015516	3015516	CME	1		
12	COVER, FRT, BRACKET, CONTINUUM WIRELESS	3015517	3015517	CME	1	PC/ABS	
13	COVER, RR, BRACKET, CONTINUUM WIRELESS	3015518	3015518	CME	1	PC/ABS	
14	SCREW, THD-FORM, TRI-LOBE, M2.9x10	-			1	SS 18-8	
15	SCREW, PUMP RETAINING, M3X0.5X16MM LONG	3016897	3016897	CME	1	BRASS	
16	WASHER, LOCK, EXTRNL TOOTH, M3 X 6MMOD	-				SS 18-8	
17	COVER, BATTERY, CONTINUUM WIRELESS	3015584	3015584	CME	1	PC/ABS	
18	SCREW, FHMS M2.0x0.4 X 6mm LG	-	400-434X	CME	5	BRASS	
19	SCREW, FHMS M3.0x0.5 x 8mm LG	-			2	BRASS	NI PLATE
20	LABEL, GAUSS LIMIT	205213	205213	CME	1		
21	LABEL, RETAINING PIN INSTRUCTION	DN-208062	DN-208062	CME	1		
22	LABEL, DATE/SERIAL TAG	205212	205212	CME	1		PRINT DATE MANUF MM/YYYY
23	LABEL, BRACKET WARNING	205210	205210	CME	1		
24	LABEL, BRACKET ID	205214	205214	CME	1		
25	LABEL, PUMP STATUS	205215	205215	CME	1		
26	LABEL, WIRELESS BATTERY REPLACEMENT	205216	205216	CME	1		
27	LABEL, WIRELESS STATUS	205217	205217	CME	1		
28	SCREW, PHMS M2x0.4 x 6mm LG	-	400-434X	CME	3	BRASS	
29	SCREW, PHMS M3.0x0.6 x12mm LG	-	400-436X	CME	6	BRASS	
30	COVER, PLUG, DC INPUT	3017332	C 400-300 X	CME	1		BLACK
31	O-RING, 20 X 1mm (.787 X .039) 70D	-	400-433X	CME	1	BUNA-N	OR EQUIV
32	GASKET	-	400-438X	CME	1	NEOPRENE CLOSED CELL FOAM BLACK	SIMILAR TO 3001882
33							
34	FOAM	-					
35	WASHER, FLAT, M2	-	400-404X	CME	5	BRASS	-
36	LABEL, QC APPROVED	-	400-333X	CME	1		
37	ANTENNA ACCESSORY LANTRONIX	3016253	930-033	LANTRONIX	1		
38	STANDOFF, F-F, M2X0.4THDX12MM LONG	3016980		CME	3	AL	OR EQUIV
39	NUT, HEX, M2X0.4	-			2		
40	CABLE, BRACKET, UPPER DC	3016543	3016543	CME			
41	CABLE, POWER, MAIN DC	3016542	3016542	CME			
42	CABLE, BRACKET, LOWER DC	3016544	3016544	CME			
43	CABLE, RS232	3016545	3016545	CME			
44	CABLE, BATTERY, BOARD, BRACKET	3016547	3016547	CME			
45	FERR, EMI SUPPRESSION PLATE, 40 OHM, 100MHZ	3018051	2644247101	FAIR-RITE	1		
46							
47							

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TITLE
ASSEMBLY, BRACKET, WIRELESS, CONTINUUM

DWG NUMBER 3015547 REV H

SEE SHEET 1 FOR REV INFO

SHEET 3 OF 3